- Rome Kraft adds 650 tons to daily capacity
- High-strength pulps from bagasse
- Highlights of 1954 output
- Mill power supply analyzed

The Paper Industry

Publishers of PAPER AND PULP MILL CATALOGUE

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ONE POUND OF STEAM GIVES	3.7 to 3.9 pounds vapor	4.8 to 5 pounds vapor	5.7 to 6 pounds vapor

*Results will vary with feed and pressure conditions.

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SINCE 1889
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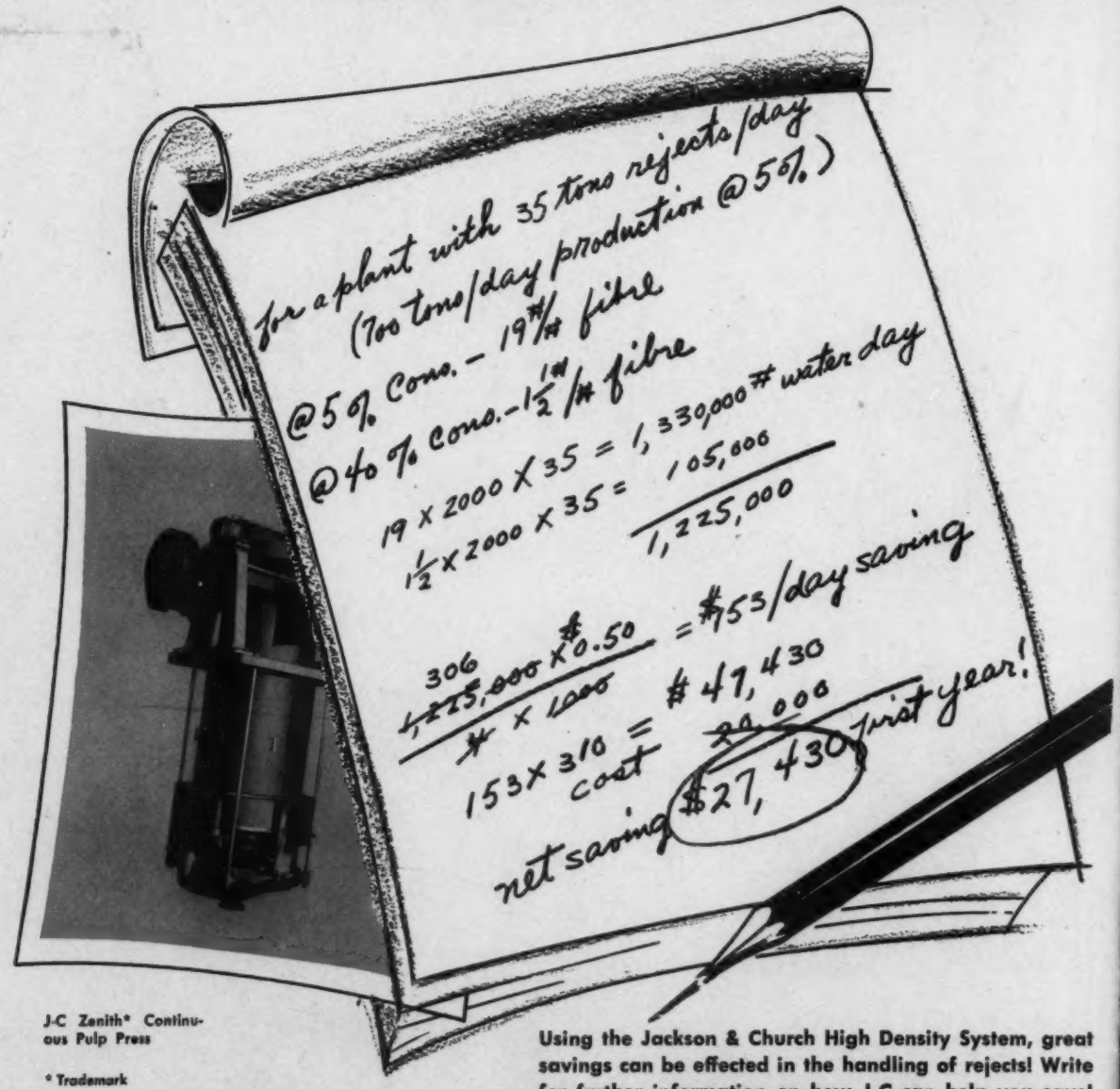
EVAPORATORS OVERLOADED?

SHORT OF STEAM?

Rejects put back into the system at low consistency can be the cause of the trouble!

Many plants are now solving this problem simply and efficiently by using a Jackson & Church High Density System. Here is what this can mean to you in dollars-and-cents savings . . .


for a plant with 35 tons rejects/day
(700 tons/day production @ 5%)
@ 5% Cons. - 19# fibre
@ 4% Cons. - 1½ # fibre
19 x 2000 x 35 = 1,330,000 # water day
1½ x 2000 x 35 = 105,000
1,225,000
306
1,225,000 x $0.50 = $153/day saving
x 1000
153 x 310 = # 47,430
cost
net saving $27,430 first year!

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Using the Jackson & Church High Density System, great savings can be effected in the handling of rejects! Write for further information on how J-C can help you save!

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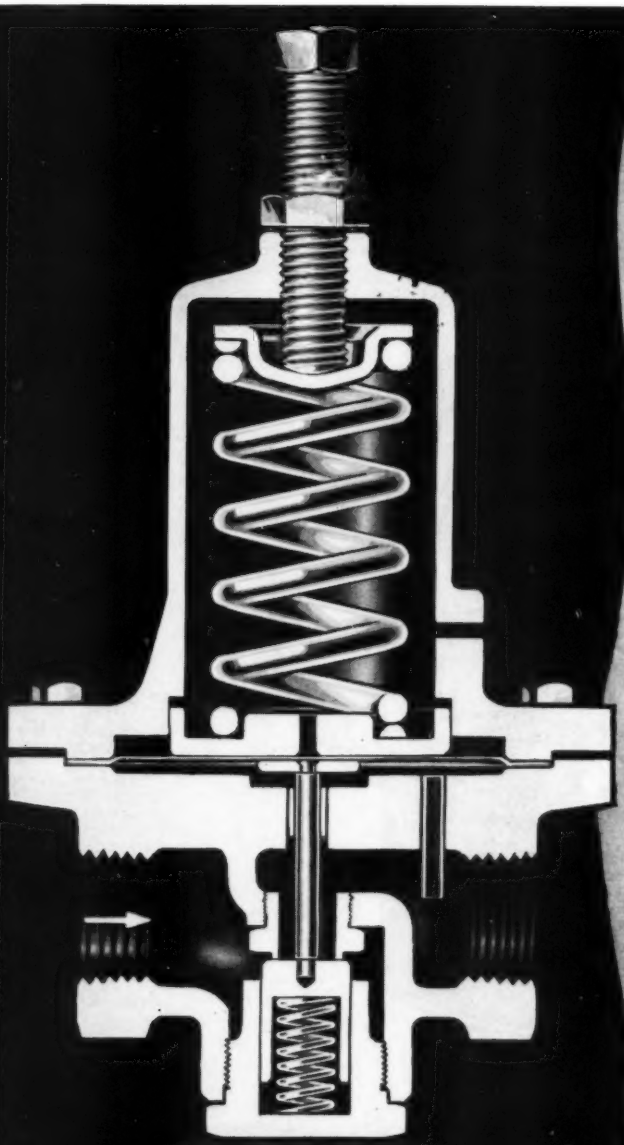

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The Paper Industry

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VOLUME 37 • NUMBER 1 • APRIL 1955

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SAVE-ALL lives up to its name at boardmill

Shown above is a Marx Save-All built by Chicago Bridge & Iron Company for use at an eastern boardmill. The Save-All was installed to recover valuable waste fibers from white water and to alleviate stream pollution. How's it doing? The latest month for which figures are available shows that the Save-All is recovering 97.4% of all fibrous solids that pass through it. Stream pollution is reduced to a like degree.

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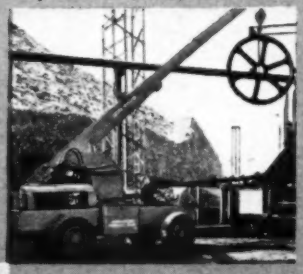


Replacing gears

Storing steel plates

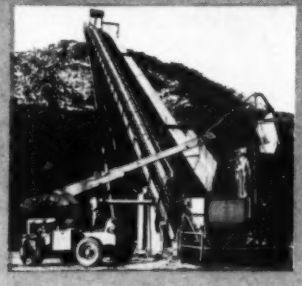
"We here at Consolidated little thought that the Austin-Western Hydraulic Crane, purchased to do a specific job, would find such universal use both in and around our plant.

"In a matter of hours after delivery, the new machine was in constant demand by all departments—bar none—and pictured here are just a few of the hundreds of jobs it is doing for us."

Beaching floating equipment before freeze up

Shuttling freight cars

Hoisting conveyor chains



Installing pulpwood conveyor dump point

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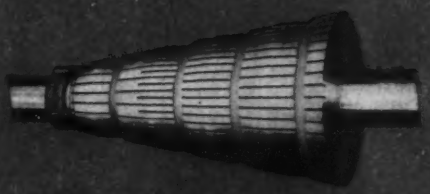

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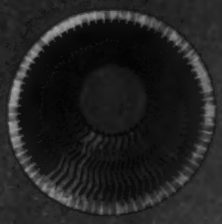

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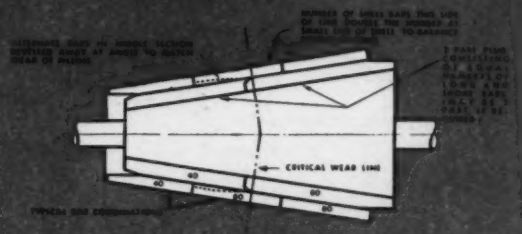

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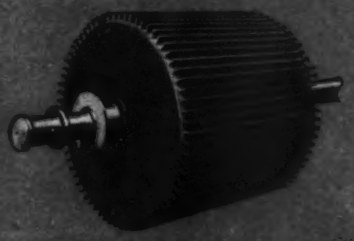

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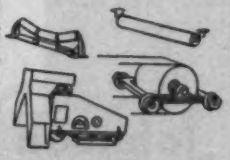

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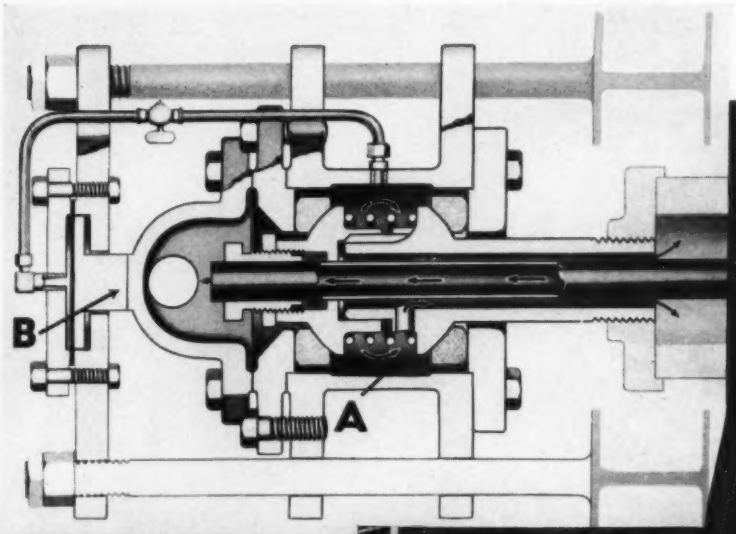

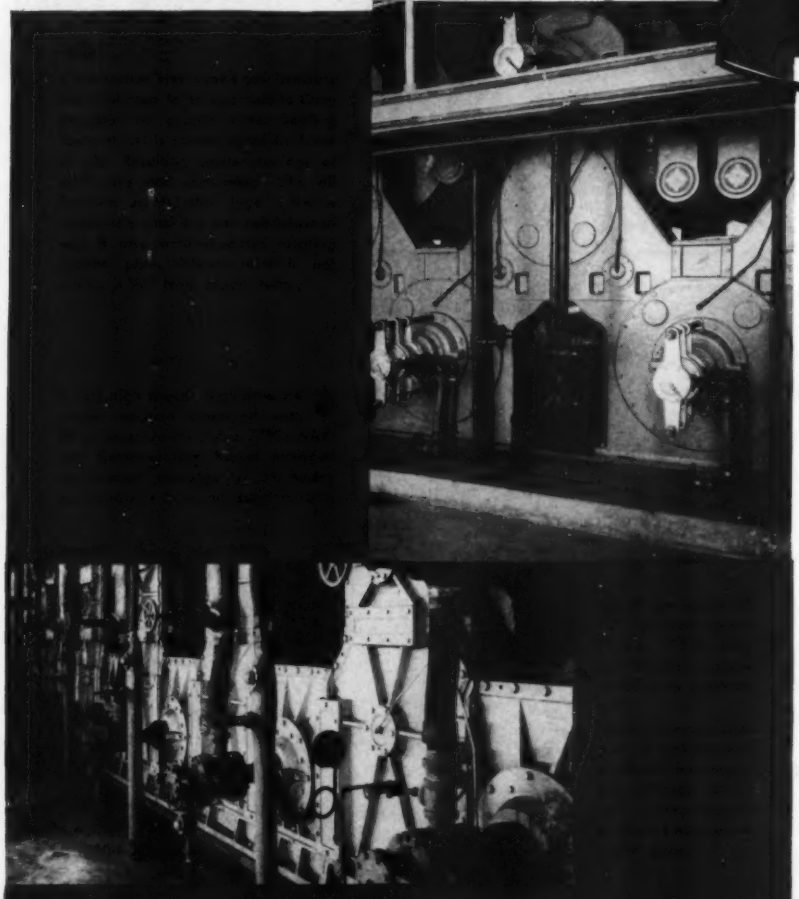

Operating speeds and pressures of drying cylinders are mounting higher and higher. So, too, are the demands on the joints used to admit steam and remove condensate.

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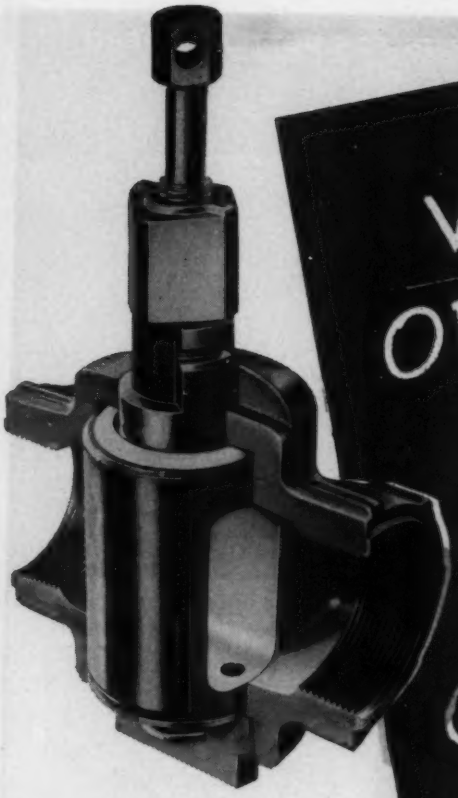

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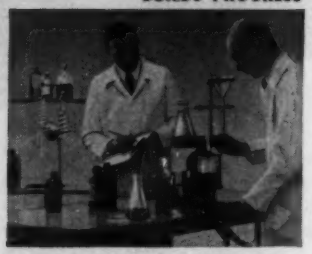

In modern, well-equipped laboratories, Staley research technicians constantly search for new products and better applications for old ones. The results of Staley's research are products and methods that help you make finer papers at lower cost.

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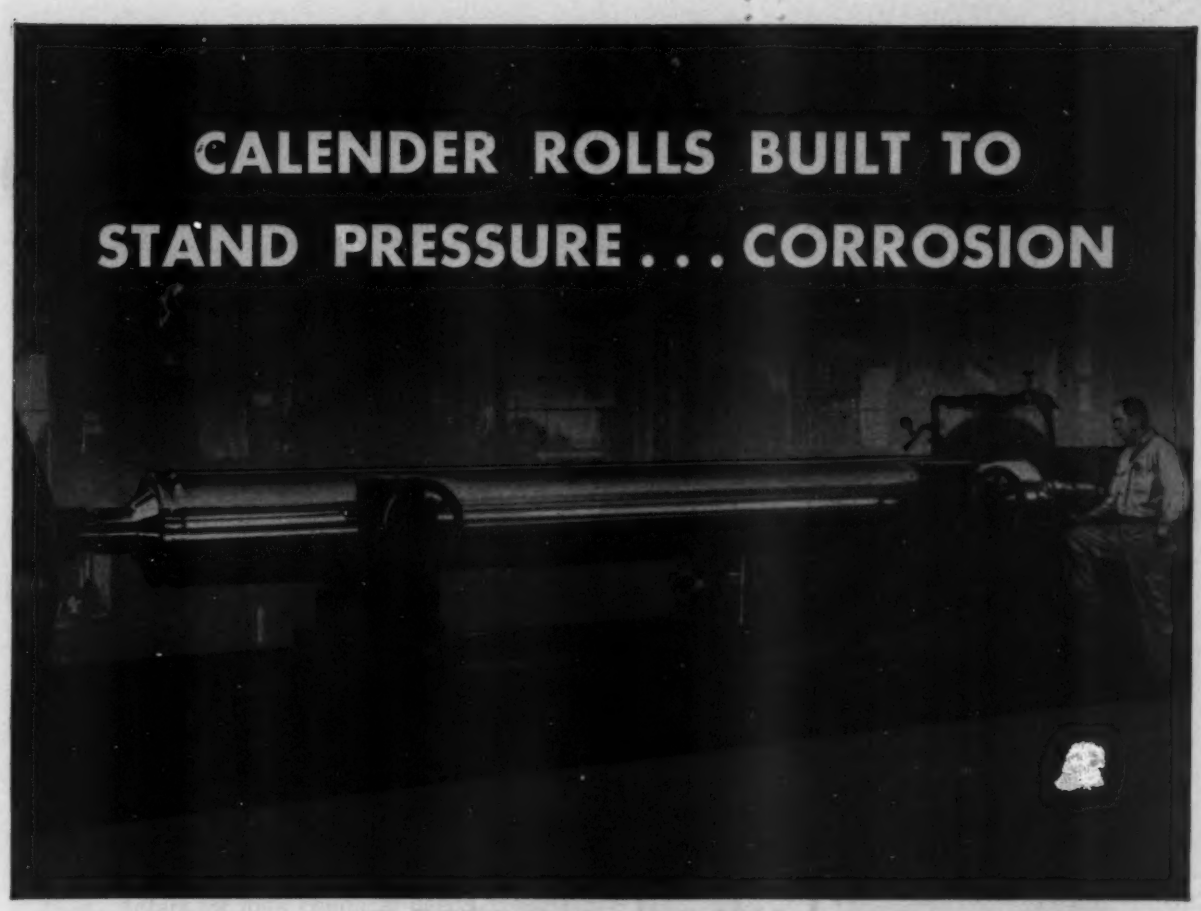

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—even a complicated one

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It is practically impossible to list all the media in which stainless steels will resist corrosion. It is even more difficult to enumerate all the conditions under which the stainless steels will resist effectively the corrosive effects of such media. Frequently, a relatively minor contaminant, when combined with the main reagent, will cause a more detrimental corrosive action than the latter by itself. This is particularly true of iron salts which, in the presence of chlorides, often prove to be a very potent corrodent, producing pitting.

It is always advisable to test a sample under actual operating conditions, especially before extensive untried installations are made. Proper tube selection starts with expert opinion, available to you through Mr. Tubes, your nearby B&W Tube Representative. There is no substitute for the kind of experience with pressure tubing problems you'll find at B&W. Ask Mr. Tubes for help in matching tubes to jobs.

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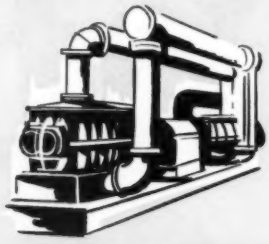
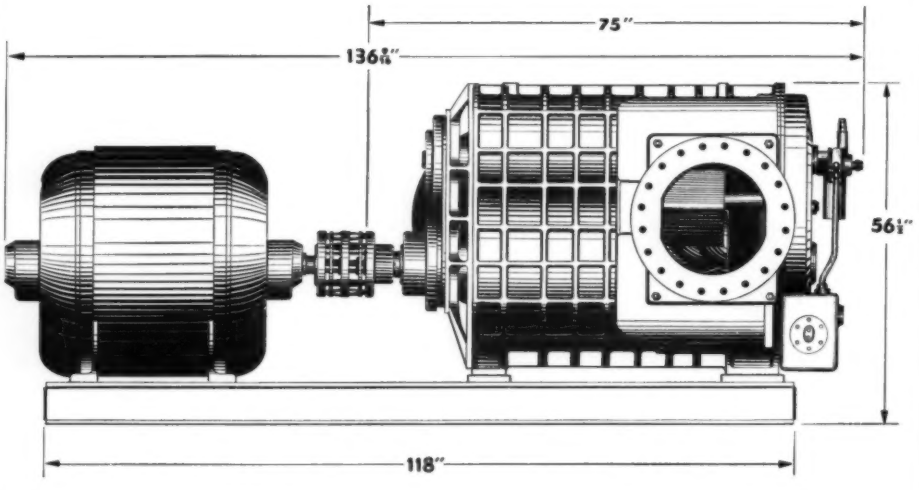
Vacuum Pump Users:

why use two-





400 HP motor
1200 RPM

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75 inches in length, weighs approximately 8,000 lbs.

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A *Standardaire* Vacuum Pump with low horsepower and single-stage simplicity will do the same job for you as most double-stage pumps . . . and for less.

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with DU PONT PEROXIDE BLEACHING PROCESSES . . .

No other process gives you such high stable brightness levels—*increases of 10-14 G.E. units where needed!* Yet, Du Pont's Peroxide Bleaching Process preserves all the desirable features of groundwood, including high opacity, good formation and excellent printing properties.

SEND FOR OUR NEW BULLETIN P62-1054, "High-Brightness Bleaching of Groundwood." It describes how you can increase your groundwood brightness for brighter, more profitable papers. Mail coupon below for your copy of this bulletin and descriptive booklet.

Meet today's demand for high-quality bleached pulp with the Du Pont Peroxide Process. You can bleach sulfate pulp to high, *stable* brightness values, retaining good strength characteristics.

Peroxide treatment improves brightness retention and color stability of bleached pulp. In most cases the Du Pont process can be operated in existing equipment, with only a small investment for storing chemicals.

SEND FOR OUR DESCRIPTIVE BOOKLET on "Peroxide Bleaching of Sulfate Pulp." Mail coupon below.

DU PONT PEROXIDES are available for prompt delivery from conveniently located manufacturing plants. Du Pont's modern plants and facilities assure you a dependable supply of top-quality peroxide for your bleaching needs.

DU PONT
PEROXIDES

Albone®.....Hydrogen Peroxide
Solozone®.....Sodium Peroxide

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

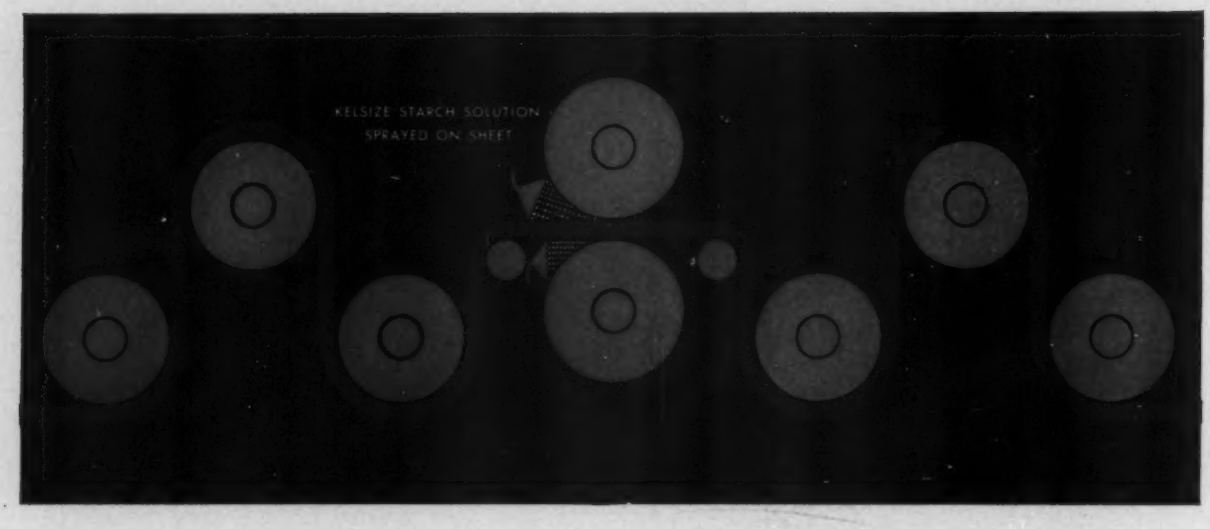
E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Dept. PI-4, Wilmington 98, Delaware
Please send me literature checked below:

- ☐ Bulletin P62-1054, "High-Brightness Bleaching of Groundwood"
- ☐ Booklet, "Peroxide Bleaching of Groundwood"
- ☐ Booklet, "Peroxide Bleaching of Sulfate Pulp"

*Name*_____
*Firm*_____ *Position*_____
*Address*_____
*City*_____ *State*_____

TEST-PROVE *increased* { *densometer* / *finish* / *printability* } *with*

KELSIZE *and* STARCH *combination*



If you use fourdrinier machines, test-prove for yourself these definite advantages of KELSIZE-Starch Solution in your size press application.

1. Increased densometer.

2. Improved control of wax penetration.

3. Improved printing surface.

4. Improved resistance to feathering on writing grades.

5. On unbleached Kraft gumming stock, application results in improved densometer, which in turn results in better gumming application and tear strength.

KELCO
REFINED ALGIN PRODUCTS

Try KELSIZE-Starch . . . a versatile combination which will give you all these advantages in one operation.

a product of **KELCO** *company*

•*This is* BLACK-CLAWSON

a tradition of engineering and manufacturing skill

Specialists in practical design and precision manufacturing, the Black-Clawson Division at Hamilton concentrates on cylinder board machines and auxiliary equipment.

Pulp mill equipment, stock preparation systems, Fourdrinier machines and converting machinery are products of the other specialized Black-Clawson divisions.

Mills that look to Black-Clawson for their equipment needs not only obtain the latest in designs but center all responsibility for performance in just one company.

THE BLACK-CLAWSON COMPANY

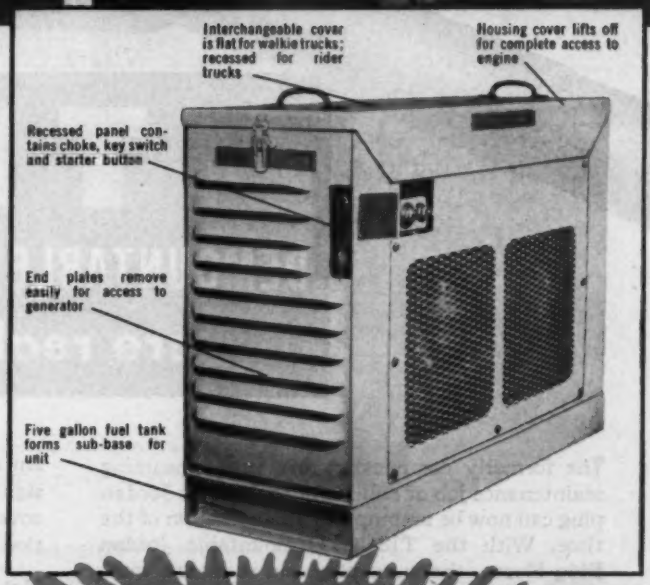
Black-Clawson Division, Hamilton, Ohio
Shartle Bros. Machine Division, Middletown, Ohio
Dilts Machine Works Division, Fulton, N. Y.
The Bagley-Sewall Corp. Division, Watertown, N. Y.
Pandia Inc. Division, New York, N. Y.
Black-Clawson International, Limited, Division, London W.1, England
Black-Clawson (Canada) Limited, Montreal, P.Q., Canada

Everything is NEW on this BANTAM

Ready-Power Gas-Electric Power Unit

FOR MOTORIZED WALKIE TRUCKS

FOR RIDER TRUCKS UP TO 2000 LBS.


Interchangeable cover is flat for walkie trucks; recessed for rider trucks
Housing cover lifts off for complete access to engine
Recessed panel contains choke, key switch and starter button
End plates remove easily for access to generator
Five gallon fuel tank forms sub-base for unit

new PERFORMANCE

Quick, positive starts are assured with new 12-volt automotive-type starting and ignition system. Complete choice of idling speeds is yours because truck contactors are battery energized. New positive type governor.

new ACCESSIBILITY

Just lift the top cover and all engine accessories, controls and instruments are within easy reach. Louvered end plate can be removed in minutes for complete access to generator.

new VERSATILITY

The Ready-Power bantam model "W" is designed with no projections. It fits practically all makes and models of walking and small riding-type electric trucks. Interchange from truck to truck presents no problem.

Here's the most foolproof, most compact, most dependable power generating unit ever built for small truck use! Months of job testing have proved that it is ideally suited for all the jobs that small trucks must do. Ready-Power gives your trucks full electric power all the time with no fatigue, no letdown. Put it to work for you soon!

TRIAL OFFERED

IN YOUR PLANT—ON YOUR TRUCK

See the new Bantam Model W in action, right in your plant. A Ready-Power sales engineer will arrange all the details. Fill in and mail this coupon.

the All New

READY-POWER

BANTAM MODEL W

The READY-POWER Co., 3812 GRAND RIVER AVE., DETROIT 8, MICH.

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

THE READY-POWER COMPANY

Detroit 8, Michigan

Gentlemen:

I am interested in your new Bantam Model W.

☐ Please send complete information.

☐ Please arrange a trial in my plant.

Company_____

Address_____

City_____ State_____

Signed_____ Title_____

TISCO®

DEMOUNTABLE JORDAN PLUG SLEEVES

are real money-savers

The formerly complicated and time-consuming maintenance job of refilling or replacing a Jordan plug can now be accomplished in a fraction of the time. With the TISCO Demountable Jordan Plug Sleeve, the worn plug and shaft are withdrawn from the engine housing, three bolts are removed, and the sleeve taken quickly from the shaft centers. The new sleeve is then fitted over the centers which are permanently adapted to the shaft. The holding bolts are replaced and the assembly is again ready for use.

An additional money-saving feature of this design is the elimination of transportation costs covering shipment of shafts for factory installation of plugs.

Not only do you get faster changeover with TISCO Demountable Plug Sleeves, but you get much longer service because they are soundly cast of wear-resistant TISCO Manganese Steel. Where highly acid conditions prevail, TIMAXX acid and wear-resistant alloy is recommended.

Ask for further information regarding TISCO Demountable Plug Sleeves, also TISCO Beater Rolls, Rag Slitters, Conveyor Chain, Barking Drum Chain, Sprockets, Log Haul Attachments, and miscellaneous castings designed to meet your own operating requirements.

TAYLOR-WHARTON IRON & STEEL CO.

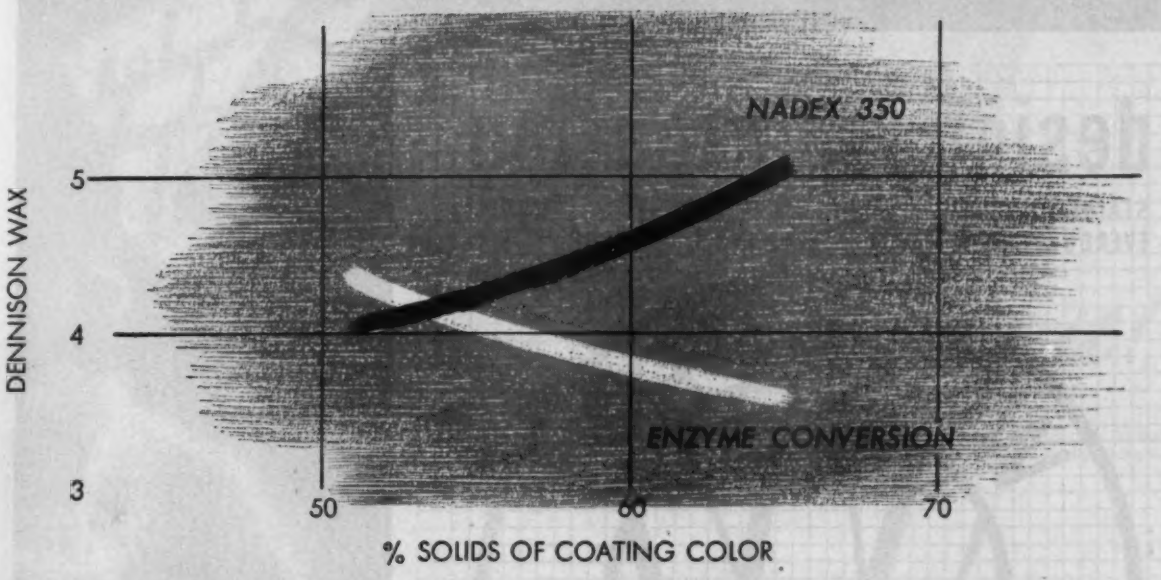
(Division of Harrisburg Steel Corporation)

HIGH BRIDGE 5, N. J.

Birmingham, Ala. Cincinnati, O. Easton, Pa.

HIGHER PICK

AT 65% SOLIDS



. . . for all coated stocks

NADEX 350 —a special dextrin for coating. Gives a higher pick than enzyme converted starches when used in high solids coatings. No matter what the stock.

NADEX 350 need only be cooked. No need for expensive conversion equipment, enzymes, extra technician time.

NADEX 350 can be cooked at 47% solids. There's more water available for pigment dispersions. Fewer formulating problems.

NADEX 350 offers good strength, adequate stability, high uniformity, and lower viscosity characteristics for machine or off machine coating.

For full information on NADEX 350 or on National's other coating dextrins or starch products write —

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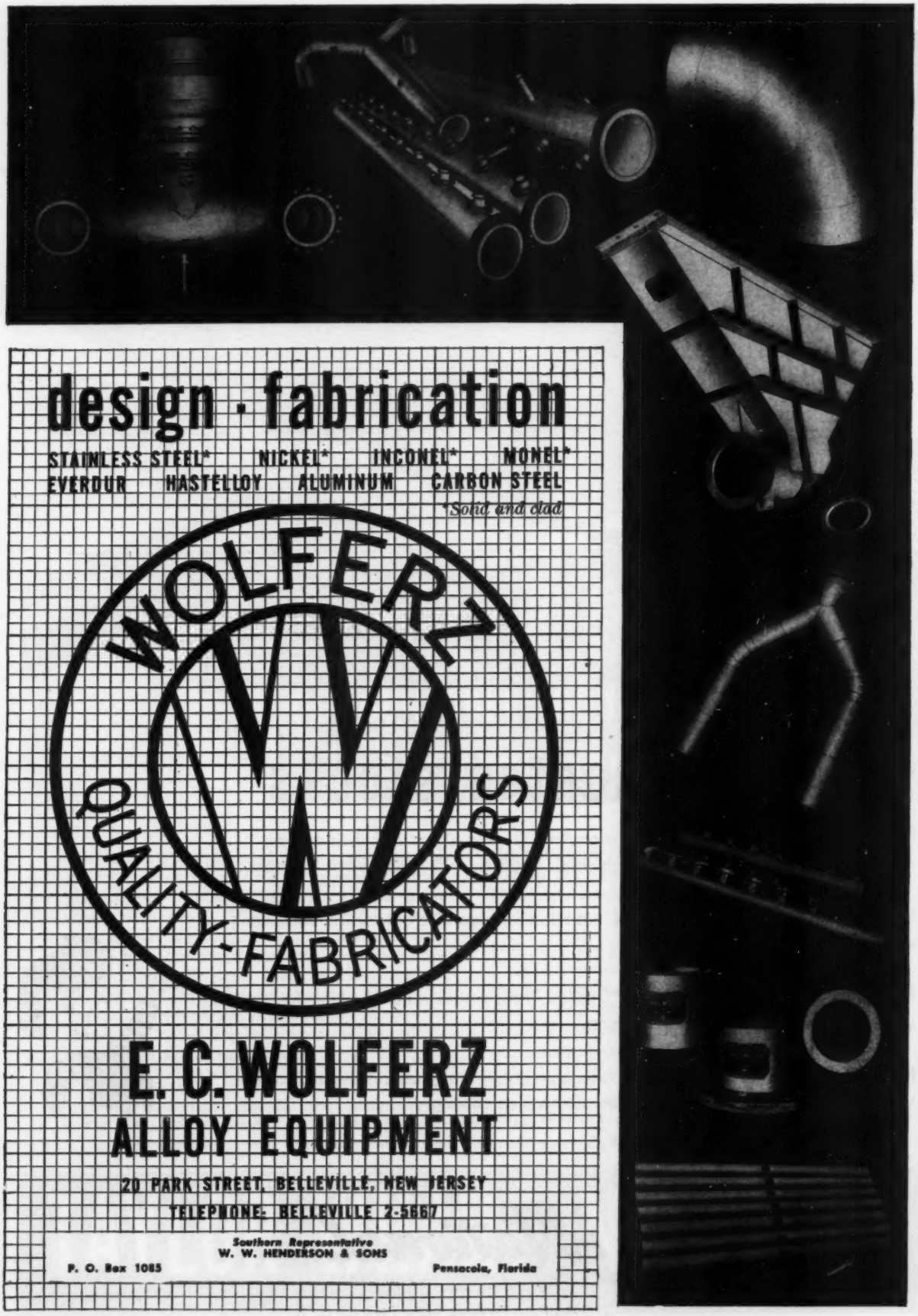
STARCH PRODUCTS
270 Madison Avenue, New York 16, N. Y.



design · fabrication

STAINLESS STEEL* NICKEL* INCONEL* MONEL*
EVERDUR HASTELLOY ALUMINUM CARBON STEEL

*Solid and clad

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QUALITY-FABRICATORS

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It takes TI-PURE®

TITANIUM DIOXIDE

to make paper opaque and bright

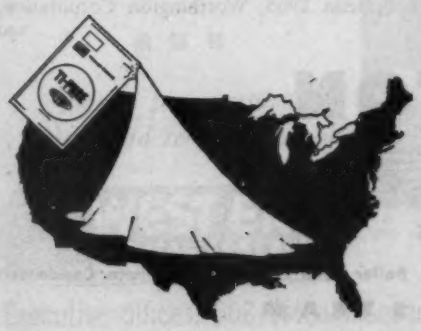
...and Du Pont makes it!

® Reg. trade-mark for Du Pont titanium dioxide pigments

YOU GET a titanium dioxide pigment which is specifically adaptable to paper manufacture. It disperses easily in water, has fine beater retention, low-water and adhesive demand—all of the important features needed for easy and sure use in paper furnishes and paper coatings. It's the best TiO_2 for paper we have ever made!

If you have any questions about the use of titanium dioxide in bread wraps, waxed board, glassine, bond or book—in fact for any paper application, just call us. Our Technical Service or Paper Laboratory may already have the answer; if not they'll be glad to work with you to find it. Just contact our nearest district office or write to: E. I. du Pont de Nemours & Co. (Inc.), Pigments Department, Wilmington 98, Delaware.

PROMPT NATIONWIDE SERVICE THROUGH THESE DU PONT DISTRICT OFFICES* AND WAREHOUSES



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DU PONT
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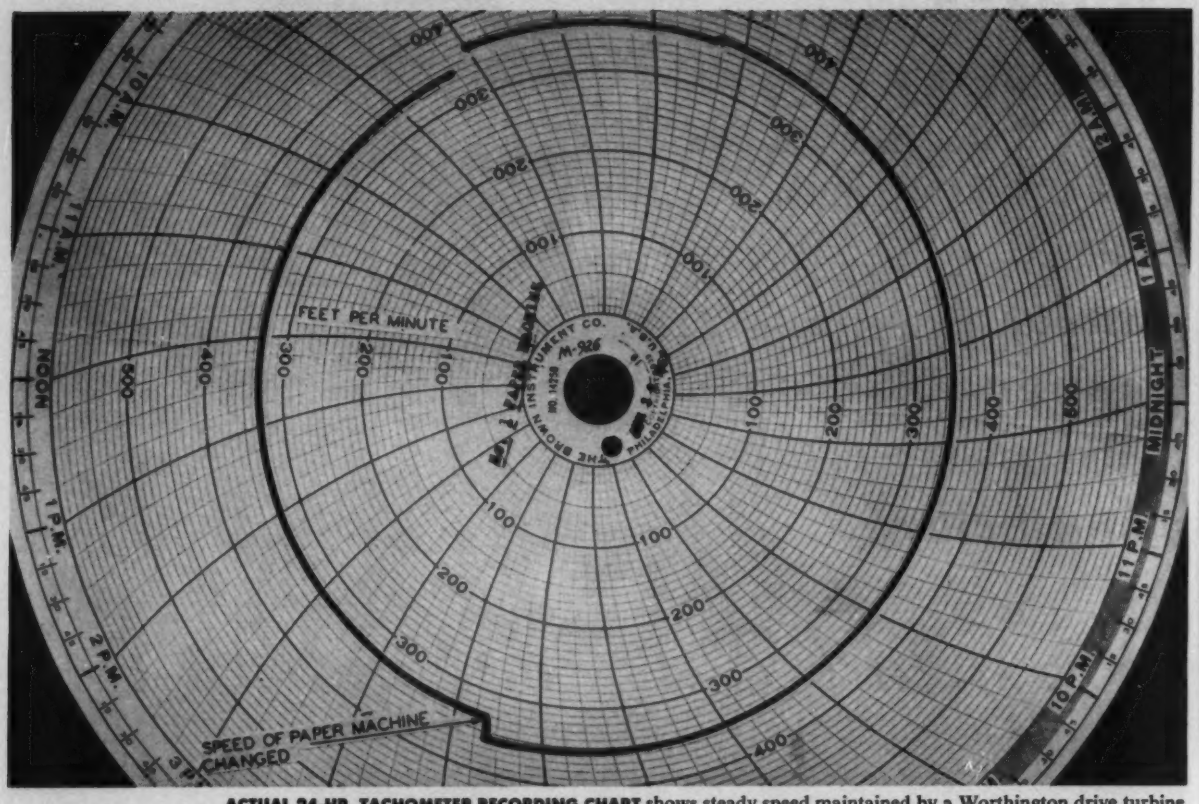
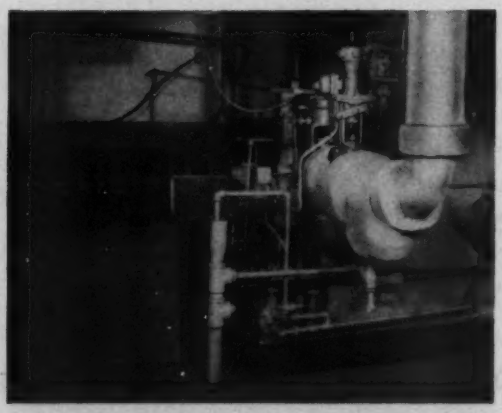
BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY

Look at this actual record



ACTUAL 24-HR. TACHOMETER RECORDING CHART shows steady speed maintained by a Worthington drive turbine.

for proof of steady lineshaft speed!



362 HP WORTHINGTON multi-stage turbine and reduction gear, driving paper machine in famous paper plant.

Worthington steam turbine drive maintains constant speed within ¼ of 1%

The speed chart above was taken recently from the tachometer of a Worthington steam turbine driving one of the hardest-working paper machines in the country.

It shows graphically how closely the sensitive governor on this turbine provides the smooth, steady speed essential to fine paper making. Installed more than 7 years ago, the turbine has given continuous service with constant speed held to within ¼ of 1% at any given speed setting. Wide governor speed range meets the requirements of any run.

This precise control pays off in greater output . . . lowered breakage rate . . . and better quality paper. Steam and maintenance costs nosedive, too.

All Worthington paper machine drive turbines are made to fit your plant layout. And you can have labor-saving remote speed control if you like. For more information, check your nearest Worthington office or write for new Bulletin 1965, Worthington Corporation, Harrison, N.J. T.S.1

WORTHINGTON

STEAM TURBINES

Single- and Multi-Stage Turbines • Turbine-Generators • Deaerators • Boiler Feed Pumps • Surface Condensers

A GREAT TEAM IN STEAM

For SODA ASH . . . WEST END serves the West best

West End serves the West quickly, efficiently and economically with highest quality soda ash. For 30 years, West End has been constantly enlarging its manufacturing and storage facilities so that the normal and emergency needs of western industry will be met promptly regardless of market conditions. Strategic location of plant permits fast, economical transport by rail or truck to any point in the West.

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Write for samples, prices and technical data.

PERSONAL SERVICE — Customers anywhere in the West are only a few hours away by company plane.

IMMEDIATE SHIPMENT to customers throughout the West in company's own leased hopper cars . . . ready at all times.

30 MINUTE IN - AND - OUT LOADING for bulk trucks at any hour of day or night through "serve yourself" delivery.

WEST END CHEMICAL COMPANY

West End Chemical Co.

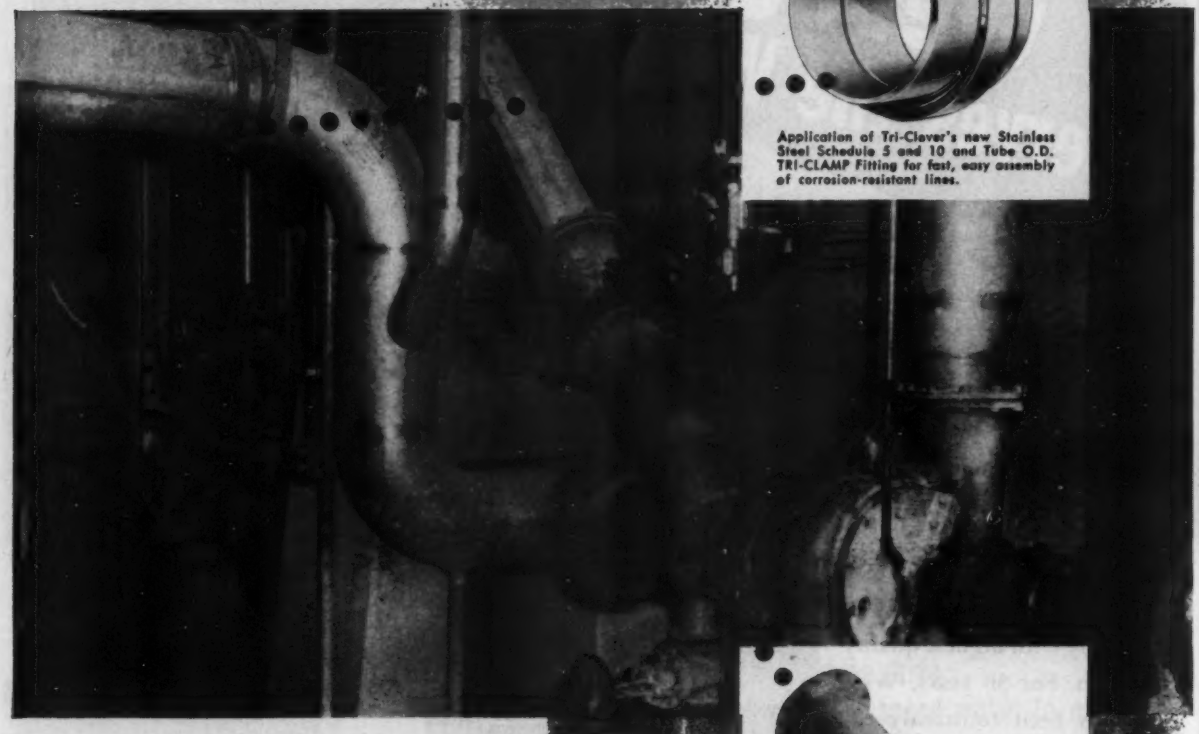
Executive offices: 608 Latham Square Building, Oakland 12, California • Plant: Westend, California

Complex piping problems easily solved with "Standard"

TRI-CLOVER

STAINLESS STEEL FITTINGS

Application of Tri-Clover's new Stainless Steel Schedule 5 and 10 and Tube O.D. TRI-CLAMP Fitting for fast, easy assembly of corrosion-resistant lines.



"Standard" Tri-Clover Stainless Steel 45-degree Lateral Fitting designed for flanged assembly . . . one of a complete line of industrial fittings for every purpose, in sizes up to 36" O.D.

● Shown here are part of the stainless steel fittings manufactured by Tri-Clover to meet the requirements of large Midwest Paper Company. The units shown above are part of the Vortrap assemblies, and include Tri-Clover "standard" stainless steel fittings to provide maximum corrosion-resistance.

Experience and craftsmanship make the big difference in the production of long-lasting, fully corrosion-resistant fittings. That's why more and more mills and plants in the chemical-process industries are specifying TRI-CLOVER . . . for the highest quality stainless steel fittings, pipe, tubing and pumps.

LADISH CO.
Tri-Clover Division
Kenosha Wisconsin

See your nearest TRI-CLOVER DISTRIBUTOR

EXPORT DEPARTMENT—8 SO. MICHIGAN AVE.
CHICAGO 3, U.S.A.

8 155

E. A. Hamann (left), Power Generation Engineer and Robert Best (right), Superintendent of Utilities, go over lubrication records with Bill Schall, Standard Oil lubrication specialist. Bill Schall has been providing technical sales service to Standard Oil customers since 1943. Bill is an engineer with a B.S. in engineering from Georgia Tech., and a graduate of Standard's Sales Engineering School. Customers of Bill's find this experience and background pay off for them.

Anheuser-Busch still using same turbine oil after 24 years

...NONPAREIL

For more than 24 years the Anheuser Busch Brewery, St. Louis, Mo., has been operating two 3,000 kw., turbines using NONPAREIL Turbine Oil. Three more turbines added to the system in 1940, '48 and '51 have also used NONPAREIL since beginning operations. The reason for choosing NONPAREIL is clear; it is guaranteed for the life of the turbine.

Since the initial installation, Anheuser Busch has not had to replace a NONPAREIL Turbine Oil fill. Neutralization number is always far below 0.15 mg. KOH/g., the degree of acidity Standard Oil guarantees NONPAREIL will not exceed. At nearly all times neutralization number is on the order of 0.03 mg. KOH/g. (See chart).

In all these years, oil systems have remained clean. There has been no problem of oil acidity in any of the five turbines. The delicate art of brewing world famous Budweiser goes on without concern over power failure due to lubrication failure.

Like to know more about NONPAREIL and its possible use in your turbines? In the midwest call your nearby Standard Oil lubrication specialist. Or, contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Anheuser-Busch Turbine Lubrication Record

Generator Capacity	Start up and NONPAREIL Installation Date	Date of Last Oil Analysis	Neutralization Number
3,000 kw.	Oct. 2, 1930	July 20, 1954	0.03
3,000 kw.	Oct. 2, 1930	July 22, 1954	0.02
2,500 kw.	June 10, 1940	July 20, 1954	0.03
7,500 kw.	Jan. 2, 1948	July 22, 1954	0.03
7,500 kw.	July 26, 1951	July 22, 1954	0.01

STANDARD

STANDARD OIL COMPANY
(Indiana)

FOR ALL YOUR ALUM REQUIREMENTS

Specify Dependable General Chemical

TWENTY GENERAL CHEMICAL PLANTS* in every section of the country produce dry or liquid Aluminum Sulfate to meet the process requirements of America's paper makers. No matter where you manufacture paper, you are close to a primary source of high quality General Chemical "Alum".

HERE IS DEPENDABILITY OF PRODUCT, OF SERVICE, OF SUPPLY — evidence all over the map of how General Chemical has continued to keep pace over the decades with the chemical requirements of the paper industry. Buy wisely . . . order Alum and your other paper making chemicals from General Chemical.

Paper-Making Chemicals By General Chemical

- Aluminum Sulfate, Standard & Iron Free
- Aluminum Sulfate, Liquid
- Aqua Ammonia
- Chrome Alum
- Copper Sulfate
- Disodium Phosphate, Anhy.
- Glauber's Salt, Crystal (Waste Neutral Salt)
- Hydrochloric Acid (Muriatic)
- Nitric Acid
- Salt Cake
- Sodium Bisulfite
- Sodium Fluoride
- Sodium Metasilicate
- Sodium Silicate
- Sodium Sulfite, Anhydrous
- Sodium Thiosulfate (Hypo)
- Sodium Tripolyphosphate
- Sulfuric Acid
- Tetrasodium Pyrophosphate, Anhy.
- Trisodium Phosphate

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KVP

Insoluble

Grease Resistant

Odorless

Tasteless

Packers of meats, fish, poultry, dairy products, bakery goods, fruits and vegetables wrap their merchandise in Kalamazoo Vegetable Parchment to make every package greaseproof and to seal in their flavors and juices. Bakers of sweet goods line their pans with KVP because of its releasing properties. Manufacturers of greeting cards, and scores of other industrial users prefer KVP because it takes printing beautifully.

Kalamazoo Vegetable Parchment is basically *paper*, made like other kinds of paper, on fourdrinier machines and dried like other kinds of paper, on woolen felts. Because of the necessity for rapid and thorough drying after each of the many operations in parchmentizing, the Kalamazoo Vegetable Parchment Company is a consistent user of HAMILTON FELTS.

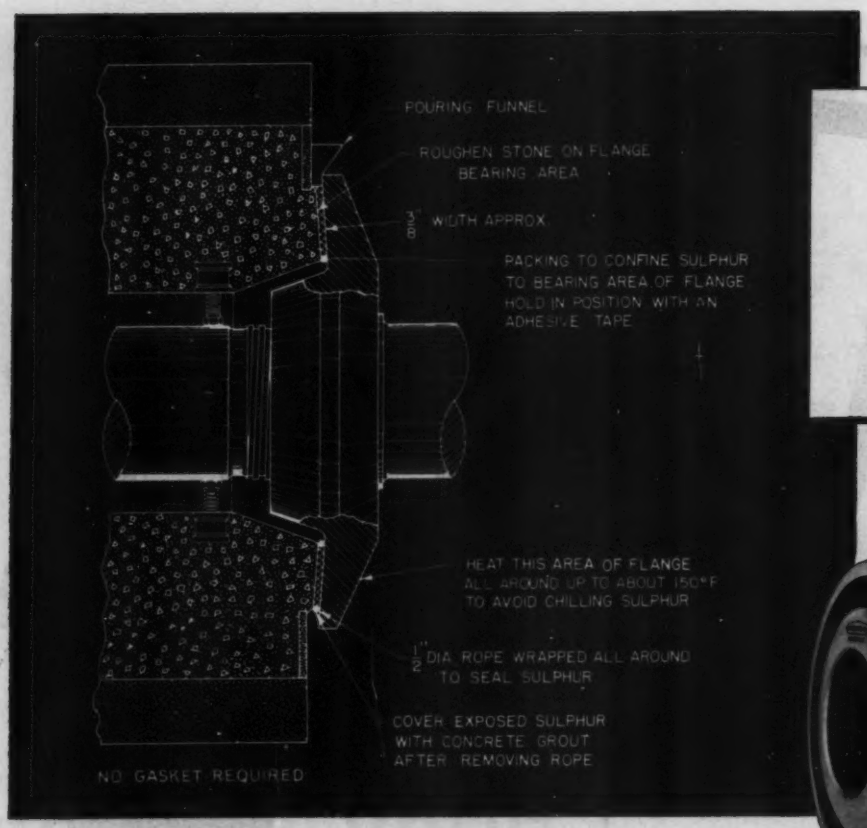
• *From the thinnest tissue to the heaviest board, there is a Hamilton Felt that will do your work better, faster and at lower cost.*

Hamilton Felts

MIAMI WOOLEN MILLS

Established 1858

SHULER & BENNINGHOFEN, HAMILTON, OHIO


POURING FUNNEL
ROUGHEN STONE ON FLANGE BEARING AREA
1/16" WIDTH APPROX.
PACKING TO CONFINE SULPHUR TO BEARING AREA OF FLANGE HOLD IN POSITION WITH AN ADHESIVE TAPE
HEAT THIS AREA OF FLANGE ALL AROUND UP TO ABOUT 150°F TO AVOID CHILLING SULPHUR
1/2" DIA ROPE WRAPPED ALL AROUND TO SEAL SULPHUR
COVER EXPOSED SULPHUR WITH CONCRETE GROUT AFTER REMOVING ROPE
NO GASKET REQUIRED

A Suggested Method of Mounting Pulpstones

Easy to Mount...

and even more important... Easy to Remove

THE method of mounting a pulpstone shown in the drawing has proved so successful wherever it has been tried that we are illustrating it here so that you may use it if it appeals to you.

While a bevel flange is illustrated this method can be used with any type of flange

Norton Pulpstone Engineering Service can be of help to you in many ways, including the specifying of the right stone to produce just the type of pulp which you require.

To remove the flanges the following method is suggested:

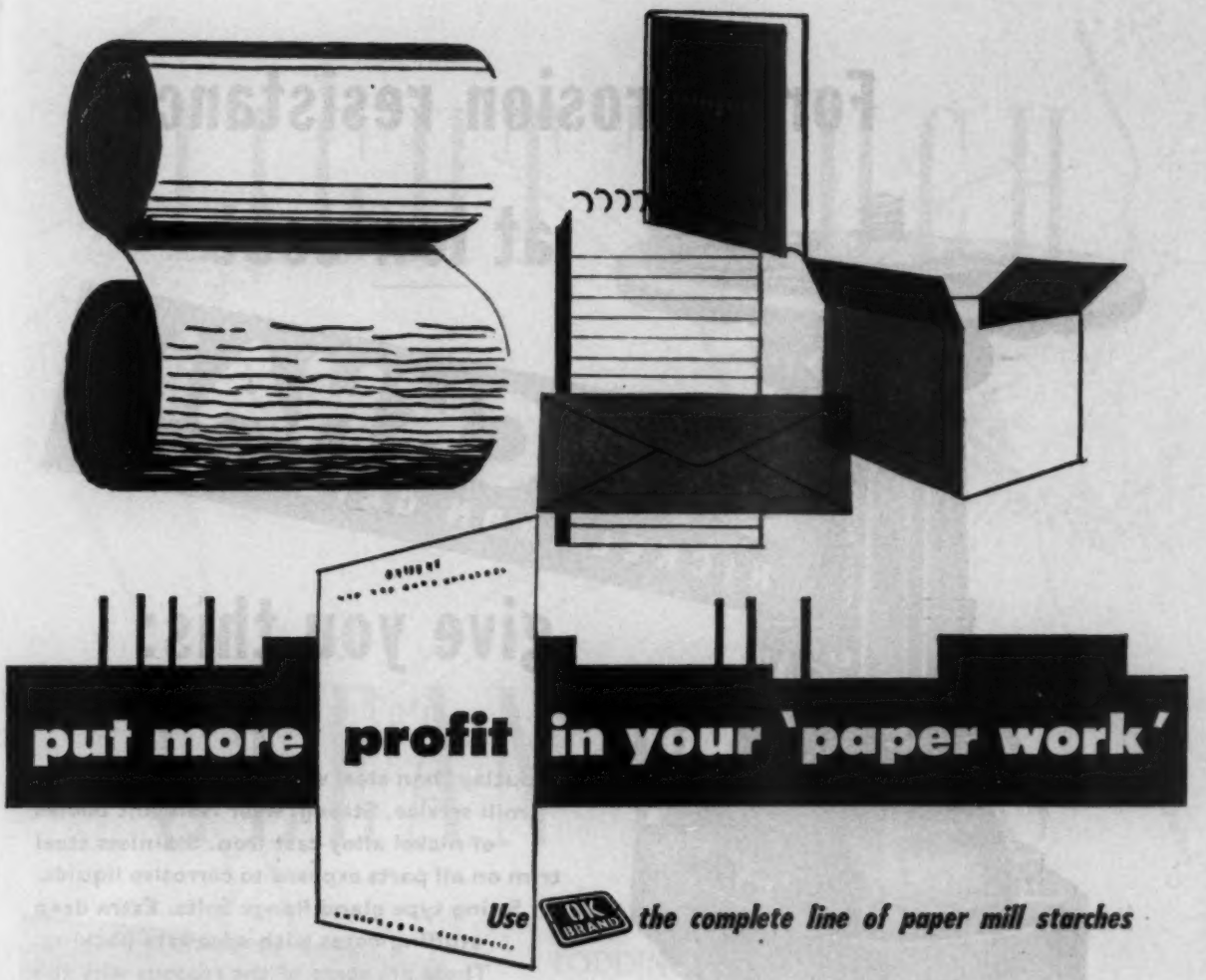
1. **Remove the cement grouting covering the sulphur**
2. **Heat the flange in the sulphured area until the sulphur melts**
3. **Then unscrew flange**

NORTON COMPANY, WORCESTER 6, MASS.
Norton Company of Canada, Ltd., Hamilton, Ontario

NORTON
PULPSTONES

Making better products to make other products better

Abrasives · Grinding Wheels · Grinding and Lapping Machines · Refractories · Porous Mediums · Non-slip Floors · Norbide Products



Use OK BRAND *the complete line of paper mill starches*

The superior quality of OK BRAND starches gives you improved tub, beater, and calender sizing. Better for coating and adhesives, too. When you make better paper at no extra cost — you've put more profit in your "paper work". Try OK BRAND and see! Discuss your special starch requirements with Hubinger's expert technicians.

the stamp of quality

OK BRAND

ESTABLISHED IN 1881

THE HUBINGER COMPANY

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New York • Chicago • Los Angeles • Boston • Charlotte

Try these top-quality starches for paper makers:

- OK BRAND Pearl
- OK BRAND E-Type Pearl
- OK BRAND Pearl 700
- OK BRAND Pre-Jel
- OK BRAND Thin Boiling Starch
- OK BRAND Oxidized Starches

For corrosion resistance at low cost

STOCKHAM NICKEL IRON GATE VALVES

give you this:

Less outlay than steel valves for pulp and paper mill service. Strong, wear resistant bodies of nickel alloy cast iron. Stainless steel trim on all parts exposed to corrosive liquids. Swing type gland flange bolts. Extra deep stuffing boxes with adequate packing. These are some of the reasons why the name Stockham on your valves means long, cost-saving service on your lines. Write for detailed information.

VALVES:
Bronze • Iron Body • Steel
Wedgeplug Dry Plug

FITTINGS:
Cast Iron Screwed, Flanged
Cast Iron Drainage
Malleable Fittings
Malleable Unions

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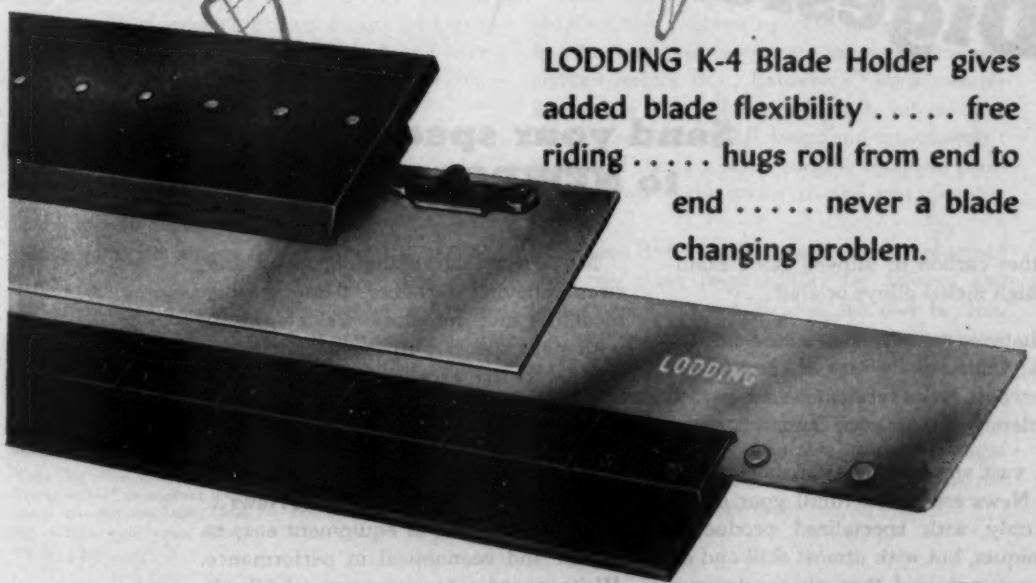
Warehouse Stocks and Sales Services Strategically Located

DISTRIBUTED THROUGH WHOLESALERS

LIGHT TOUCH CLEAN ROLLS



LODDING K-4 Blade Holder gives added blade flexibility . . . . . free riding . . . . . hugs roll from end to end . . . . . never a blade changing problem.

LODDING DOCTOR

LODDING ENGINEERING CORPORATION • Worcester, Mass.

A 31-foot digester loaded for shipment to a southern paper manufacturer.

Ordering Digesters?

Send your specifications to NEWPORT NEWS

Whether carbon or alloyed steel, Stainless, high nickel alloys or clad...

Whatever your specifications call for ...and whatever the size of components ...Newport News fabricates each part to completely answer your demands.

In vast steel fabricating shops, Newport News craftsmen fulfill your orders not only with specialized production techniques, but with utmost skill and experience acquired through construction of numerous digesters.

Modern radiographing apparatus and stress-relieving furnaces, flame cutting machines and automatic welders, along with many special purpose machines contribute to the excellence and speed of Newport News fabrication.

Send us your inquiries. Take advantage of the high integration of skill and production facilities at Newport News... for it assures you of equipment easy to install and economical in performance. Write us today for your copy of *"Facilities and Products."*

NEWPORT NEWS Shipbuilding and Drydock Company

Newport News, Virginia

The New York & Pennsylvania Company found that...

for complete process instrumentation

ONE SOURCE STANDS OUT!

Like other leading companies, the New York & Pennsylvania Company, makers of fine book and specialty papers, found that Fischer & Porter offered them integrated instrumentation and control systems — *all from a single source.*

Converting their Johnsonburg, Pa., mill from batch-type stock preparation to continuous automatic stock preparation called for five separate blending systems feeding five separate paper machines, plus a complete refiner control system — all integrated into one centralized control station. And to get the jump on competition, the N.Y. & Pa. Co. had F&P do a complete conversion all in one fell swoop!

Write for details on the F&P Ratographic* miniature pneumatic recorder-controller, offering 4-inch strip chart record.
*T.M., F&P Co.

From one source, the N.Y. & Pa. Company obtained the engineering experience and know-how to design and instrument the system, the specialized meters (e.g., Ratosleeve* stock meters) and valves (e.g., Ratogate* stock valves) and instruments (all of F&P design and manufacture) to control the processes, and the complete panel fabrication right down to the last graphic symbol.

Because the complete package was obtained from one team, responsibility for delivery and performance was not divided, the cost far less. Perfectly matched instruments, rather than non-mating components, meant complete satisfaction for this customer.

Write today and tell F&P your needs — the answers will be yours quickly, without obligation. Compare and you must agree — F&P *is the one source that stands out.*

complete process instrumentation

FISCHER & PORTER CO.

2145 County Line Road, Hatboro, Pa.

LA 1028

MEASURING, RECORDING AND CONTROLLING INSTRUMENTS • CONTROL PANELS • DATA REDUCTION SYSTEMS
CONTRACT INSTRUMENTATION RESEARCH • CHLORINATION EQUIPMENT • INDUSTRIAL GLASS PRODUCTS

POWELL VALVES . . . THE COMPLETE QUALITY LINE . . . POWELL VALVES

Fig. 2309—Flush Bottom Tank Valve for 150 Pounds W. P. Disc Opens Into Tank.

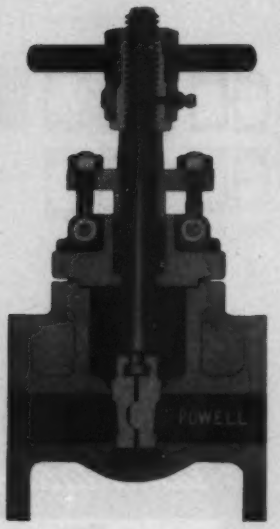


FIG. 2495 (Sectional)—Stainless Steel O. S. & Y. Gate Valve For 150 Pounds W. P. Double Wedge Disc Is Accurately Guided Into Seat.

FIG. 2342—Flanged End Bolted Cap Swing Check Valve. For 150 Pounds W.P.

FIG. 3059-G—300-Pound Steel Lubricated Plug Valve. Gear Operated.

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CURRENT COMMENTS

No longer second class . . . the tariff battle . . . and prosperity

An important forward step has been taken by the administration in establishing a saner contact with the nation's industries. Trade association executives are no longer second class citizens. At one time the attendance of trade association executives at industry meetings in the Department of Commerce was often discouraged, if not entirely banned. Apparently as a carry-over from past administrations, the feeling among top government officials seemed to be that because an individual was employed by the industry he was not to be trusted as a participant in shaping government-industry relations.

Now, however, Secretary of Commerce Weeks has notified association executives that they are eligible for participation in all industry meetings within the Department, where attendance is by invitation. The new policy in effect recognizes that association executives are possibly better posted on over-all business conditions within their respective industries than is any single manufacturer.

In tariffs, a closed door

The Congressional battle over foreign trade legislation is continuing unabated. The House has passed a bill putting into effect some of the recommendations of the Randall Commission—over the violent protests of many old-line Republicans. When it reached the Senate and was referred to the finance committee it met immediate objection from both Republican and Democratic leaders, even though it had been urged as an administration measure and was a bequest to the Republicans of the original Democratic tariff policy. The protests from various industries were so numerous that the finance committee finally closed the door on further applications to be heard, granting only two weeks of hearings. Those not appearing were told they must present their views in formal briefs. That the bill will receive rough treatment in whatever form it reaches the Senate floor is certain.

Meanwhile, a suit filed in the United States District Court at Washington challenges the constitutionality of the entire Reciprocal Trade Agreement program. The complaint was filed by a glass manufacturing company against Secretary of the Treasury Humphrey, citing injuries to its business from what it calls unconstitutional tariff rate reductions. The justice of the suit is being supported by Senator Malone of Nevada, who is possibly the most outspoken protectionist advocate in either house of Congress.

A survey of business conditions in the paper industry, gathered during Convention Week from various groups, sustains the expectation that the early half of 1955 will see material prosperity. A most striking feature of recent developments is the shift in pulp shipments. Instead of being a predominantly pulp importing country, the United States shipped overseas almost half a million tons of pulp during 1954. This condition is continuing for spring shipments.

Pulp prices up

Two mills have announced an increase of $5 per ton for bleached sulfite pulp, effective for the second quarter. Bleached kraft is also expected to rise $5 per ton at the same time. Canadian and Scandinavian unbleached sulfite will probably rise to $126.50 per ton, as against the domestic quotation of $120. This will undoubtedly eventually be passed on in the price of various papers.

Operations in the Lake States region indicate heavy demand for paper, with some mills on a maintained seven-day week basis. Groundwood paper mills operated on a satisfactorily profitable basis in most of 1954, though experiencing a falling off in sales.

Wrapping paper demand continues strong. Kraft exports have been growing, especially in the South African market. Normally, exports of American paper are principally to such areas as Latin America and the Philippines, all of which are favorable to American goods when prices permit.

The world market is strong. The come-back in Western Europe has been little less than astounding. In some segments, paper production has gone above any pre-war figures.

The upsurge of such packaging materials as foils and cellophane is being closely watched by the manufacturers of competitive paper food wrapping material.

All in all, present indications do not serve to discount the optimsism shown at Paper Week meetings in February.

Financial Reports

The slump in the stock market during the first days of the week of March 7 did not seriously affect paper mill securities. In fact, some were even priced at highed levels on March 10 than they had been a month before, even after some slight liquidation.

Net Incomes

American Box Board Co.—Net income for 1954 was $2,073,427, as against 1953 income of $1,472,671.

American Writing Paper Corp.—Net 1954 income was $533,738, as against $579,743 in 1953.

Bird & Son, inc.—Net income for 1954 was $1,606,313, as against $2,045,735 in 1953.

Brown Co.—Net income for the year ended November 30 was $3,411,175, as compared with $3,050,696 for the previous fiscal year.

Celotex Corp.—Net income for three months ended December 31 was $750,000, as against $315,489 for the comparable quarter a year ago.

Certain-Teed Products Corp.—Net income in 1954 was $5,315,721, as compared with $3,940,943 in 1953.

Champion Paper & Fibre Co.—Net income for the quarter ended December 31 was $2,376,648, as compared with $2,603,804 for the like period in 1953.

Crown Zellerbach Corp.—Net income for nine months ended November 30 was $23,908,000, as compared with $19,950,000 for the same period a year before.

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FERROLITE COLORS are Red, Brown, Green, Gray and Black.

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"Acid proof" Ferrolite floors are especially suited for paper mills, chemical plants, acid processing plants, in fact wherever chemicals or acids combine with heavy concentrated floor loads to create a flooring problem.

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Current comments . . .

Puget Sound Pulp & Timber Co.—Net income for nine months ended September 30 was $2,368,106, as compared to $2,167,250 for the 1953 period.

Rhinelander Paper Co.—Net income for the three months ended December 31 was $388,145, as compared with $448,713 for the same quarter of 1953.

Riegel Paper Corp.—Net income for 12 months ended January 2 was $1,638,021, as against $1,622,990 for the preceding fiscal year.

St. Croix Paper Co.—Net income for the nine months ended September 30 was $972,963, as compared with $728,909 for the same 1953 period.

St. Regis Paper Co.—Net income in 1954 was $14,930,489, as against $16,156,903 in 1953.

Sutherland Paper Co.—Net income for 1954 was $3,876,813, as against $2,957,303 in 1953.

Union Bag & Paper Corp.—Net income in 1954 was $10,794,000, as against $9,889,161 in 1953.

Stock and Bond Quotations

New York Stock Exchange — Stocks

Closing Prices	March 10, 1955	Feb. 10, 1955
A.P.W.	5⅛	5⅛
Celotex	30¼	29⅞
Same Pref.	19½	19½
Certain-Teed	25⅝	27⅛
Champion P. & F.	54	53¾
Same Pref.	100	*107½-109
Chesapeake Corp.	46½	45¼
Container Corp.	64	65⅛
Same Pref.	*101½-103	103¾-103¾
Continental-Diamond	18	17
Crown Zellerbach	66⅛	60¼
Same Pref.	104¾	*104½-105¼
Dixie Cup	56½	54½
Eastern Corp.	24⅝	22½
Federal Paper Board	36	...
Robert Gair	28¾	30
Gaylord Container	33½	34⅞
Great Northern	79½	*81-83
Hammermill	25⅞	25⅜
International	88½	90½
Same Pref.	*103½-105	104½
Kimberly-Clark	46⅛	41½
Same Pref.	183	*163-167
MacAndrews & Forbes	*50-51½	50¼
Marathon	31½	29
Masonite	29⅝	30
Mead Corp.	55	55⅜
Same Pref.	*102½-103¼	*102½-102¾
Same Sec. Pref.	*61-64½	*61-64
Minnesota & Ontario	58	...
National Container	15	15⅛
Same Pref.	26½	26½
Oxford	37⅛	...
Same Pref.	55½	...
Rayonier, Inc.	68¾	63¼
Same Pref.	40	39⅞
Rhinelander	33¼	...
Scott	61⅝	60¼
Same $3.40 Pref.	*96¼-97	*95½-97½
Same $4.00 Pref.	*105½-107	*105-107
St. Regis	36	38
Same Pref.	101⅞-102½	*103-104
Sutherland	54	52
Union Bag & Paper	76	74½
United B. & C.	18⅝	*18⅜-18⅝
United Wall Paper	2⅛	2⅛
Same Pref.	*18½-19	*16¾-18
U.S. Gypsum	225	230½
Same Pref.	...	181
West Virginia	39	40
Same Pref.	*107-107¾	108

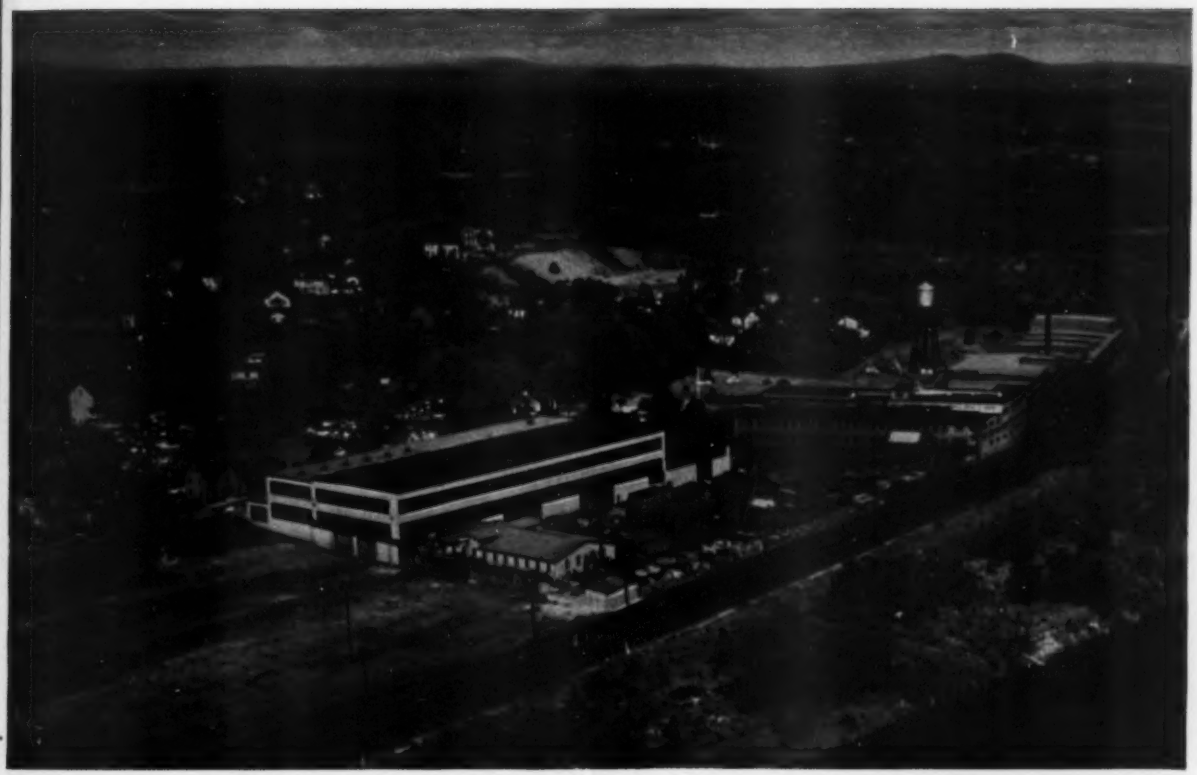
New York Stock Exchange — Bonds

Celotex 3¾	...	...
Champion P. & E.	...	...
Mead Corp. 2⅞	...	...

American Stock Exchange — Stocks

American Writing	18⅜	20
Brown Co. Common	15½	16⅜
Same $5 Pref	110	116
Puget Sound	48	50

*Closing Bid and Asked Prices.



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Weyerhaeuser researchers devote constant effort toward finding better means to efficiently process woodpulp for papermakers in a competitive market. Stronger, better fibres result in paper and paper products unequalled for their superiority in either domestic or foreign competition. Woodpulp research is moreover carried on so that more *new* products from woodpulp can be economically manufactured.

Indeed, from woodpulp to paper is merely part of the story. From pulp to cellophane, photographic film, sausage casings, lacquers, plastics, smokeless powder, and endless other products would still not give the whole picture. Researchers are every day developing significant new products from woodpulp to improve our living.

It is therefore clear why the Weyerhaeuser Timber Company, through its research facilities and its scientific methods of tree farming and manufacturing, is dedicated to supply—without interruption—the woodpulp that industry requires.

The Paper Industry

April 1955

New research results in pulp from bagasse

WHILE THE ACTUAL PROBLEM of production of pulp from bagasse must be considered as one of regional impact only, its interest on a national scale derives from the fact that any sizeable development in this direction will replace certain pulp requirements now supplied from other sources.

Currently there is renewed activity being directed toward the development of workable methods that will yield a satisfactory pulp from bagasse. This has come after years of paralyzing discouragement resulting from, among other things, the fact that growth changes occurring in annual plant crops and the variations in the raw material growing in different geographical locations have made it difficult to obtain pulps of sustained and uniform quality. In addition, there are differences in methods of harvesting and processing that introduce another variable in this raw material for papermaking purposes.

The problems entailed in making pulp from bagasse are rapidly being overcome. So much so, that even those basically prejudiced against this development now concede that some of the paper samples made from bagasse show considerable merit. We have, therefore, no alternative but to reconcile ourselves with the situation that the pulp and paper from bagasse will find a definite and productive place in the economy of regions and nations that have developed a prosperous sugar cane growing industry.

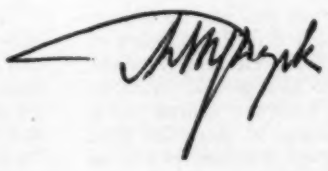
The research results presented by Dr. William J. Nolan elsewhere in this issue must be viewed as a milestone in this development. First, he describes an effective way of separating the pith from the fiber, leaving a clean fibrous fraction amounting to 70-80 per cent of the original bagasse. With this method, Dr. Nolan believes "it should be possible to process daily some 100 tons of clean fiber on a continuous screen belt with a width of 75 feet, washing length of 53 feet, and speed of about 126 fpm."

His results further show that pulps with 95-98 per cent alpha-cellulose content can be obtained in five minutes cooking time at a surprisingly low steam pressure of 880 psi, which makes bagasse fiber ideally suitable for rapid continuous cooking.

Papermaking pulps, according to Dr. Nolan's results, are obtainable in yields of 60-63 per cent from the depithed bagasse, and these pulps are superior to a high grade unbleached pine kraft pulp in burst, tensile, and folding strength. They are, however, inferior in tearing strength.

Moreover, a most interesting observation is that the burst, tensile, and folding strength of bagasse fiber exists to a remarkable degree even before beating. Maximum strength is developed after a very short time in the beater, so that power consumption will be comparatively low in refining bagasse pulps.

The developments in bagasse pulping should be a reminder to us to approach the subject of raw materials for papermaking with an open mind, and it may be taken for granted that changes in paper and paperboard manufacturing methods are even more imminent.



The new Beloit 2000-fpm, 252-in. wire fourdrinier board machine

New Rome Kraft mill adds 650 tons to daily capacity

THE NEW Rome Kraft Co. mill at Rome, Ga., adds 650 tons to the daily national production capacity of kraft container board. It uses 1,300 U. S. cords of pulpwood, 15,000,000 gallons of water, 250 tons of coal and 300 barrels of oil per day, and employs 600 people.

This article describes the highlights of the installation and operation of the Rome mill, the outstanding feature of which, apart from the acquisition of the most modern equipment and facilities, is the exemplary integration of over-all operating facilities adapted to the specific needs of the company. (See chart of mill layout).

The mill was designed by Rome Kraft engineers, while Maxon Construction Co. of Dayton, Ohio, served as general contractors.

Managing personnel

The men who guide the operation of the new mill and who to a large extent participated in the planning of the new mill are Herbert A. Kidd, vice president and general manager; Lawrence C. Crowder, general superintendent; George W. Reynolds, plant engineer; Albert Simpson, power superintendent; Anthony J. Parrino, paper mill superintendent, and James A. Whelan, pulp mill superintendent.

It is to the credit of these men, as well as to the excellent performance of the installed equipment, that the start-up of the mill proceeded without mishap, and that a smooth operation has been maintained subsequently. The fact that the company, as a matter of policy, staffed its plant largely with local and consequently inexperienced labor makes this a truly remarkable accomplishment.

Wood preparation

Pulpwood logs, arriving by rail or truck, are unloaded by cranes and conveyed mechanically by chain conveyors to three 12-ft. diameter by 45-ft. barking drums. A novel feature of the barking drums are the sliding gates which close the drum opening vertically and control the flow of barked logs.

The barked logs are conveyed to either (1) two 10-knife left hand chippers equipped with the new "V" spout or (2) the 300-ft. long stacking unit which is one of the largest in the country and capable of handling 50 cords pulpwood per hour.

The stacker support travels on a track and swings 570 ft. through an arc of 172°. The last portion of the stacker, which is cantilevered, is 130 ft. long.

The chips are conveyed to a flat-bottom 1200-ton-capacity rectangular bin equipped with three traveling screw unloaders. Rotating, transversing screws move the chips to a conveyor which selectively fills the digesters.

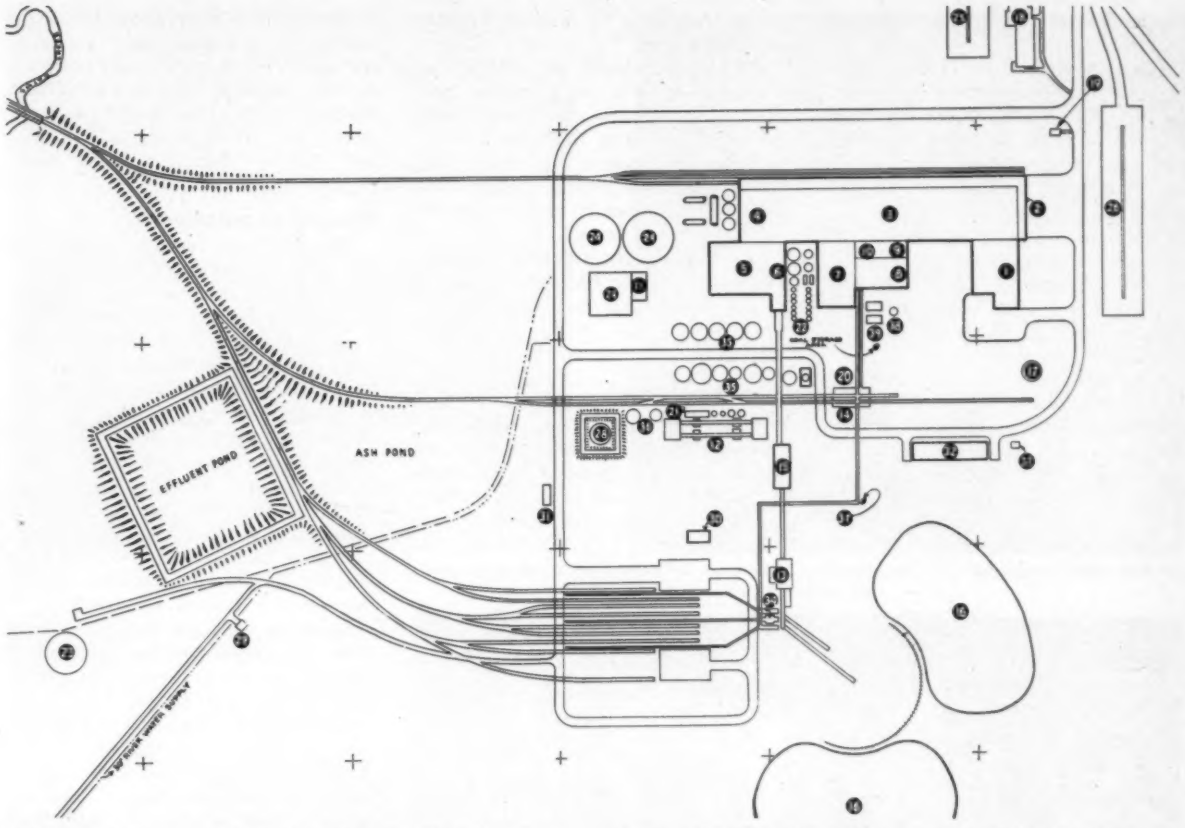
The chips are delivered from the flat-bottom bin to a 48-in. wide belt conveyor which passes over a weightometer. The weightometer automatically fills each digester with a pre-set quantity of chips through a Loading Out Counter.

A heavy-duty hydraulically-operated knife grinding machine keeps chipper knives in condition for excellent performance to supply uniform 5/8-in. chips.

Digesters

There are eight 4730-cu. ft. capacity digesters capable of holding approximately 60 tons of wood chips each.

Addition of white liquor to the digesters is completely automatic. Eventually the addition of black or spent liquor, which is used to furnish addi-



Plant layout of the new mill of Rome Kraft Co. at Rome, Ga., shows (1) shops and stores; (2) truck shipping platform; (3) paper machine room; (4) refiner room; (5) washing and screening room; (6) digester house; (7) recovery room; (8) boiler house; (9) turbine room; (10) feed water treating room; (11) fire pump house; (12) causticizing plant; (13) chipper room; (14) train shed; (15) chip storage; (16) barked wood storage pile; (17) water storage tank; (18) office; (19) gate house; (20) salt cake storage; (21) slaker house; (22) evaporators; (23) blending tank; (24) water treatment plant; (25) office parking lot; (26) mill parking lot; (27) raw water intake structure; (28) oil storage tank; (29) control center; (30) colored locker room; (31) scale house and woodyard supt. office; (32) maintenance shop; (33) paint shop; (34) woodyard control center; (35) liquor tanks; (36) lime mud storage; (37) bark storage; (38) stack, and (40) precipitators

tional volume in the digesters, will also be done automatically.

Forty-two cooks are completed daily, one of which takes care of re-cooking 100 per cent screen rejects. The cooking of rejects is done separately as a result of considerable experimentation by the company in an attempt to find the most economical way of processing these. The rejects are passed through a pulp press prior to the re-cooking operation. Reject pulp yield is about 70 per cent of the regular cook yield.

Upon completion of the cook, the contents of the digesters are discharged through 12-in. motor-operated seatless blow valves, controlled from push-button panels, into two blow-tanks equipped with 42-in. — 48-in. blow tank agitators.

The low-pressure steam formed as a result of the pressure drop is condensed in a cascade type condenser, and the hot water so formed is used for pulp and lime mud washing.

A hood extends over the top of the eight digesters. It is made of asbestos panel construction and is divided by partitions, with eight connections from the hood to the exhaust fans. The chip chutes extend through the hood to the digestors.

Recovery and caustisizing systems

The black liquor from the digesters is passed to two sextuple effect long-tube vertical evaporators with counter current barometric condensers, where it is concentrated to 55 per cent total solids. From here it passes over two cascade evaporators, which concentrate it to 70 per cent solids.

A 6½- by 14-ft. Waco filter rated at 2100 gpm has been installed for use on black liquor service. The filter is operated from a push-button panel, which includes level control of three levels in the filter.

An interesting part of this control is the fact that the vat level is controlled by the drum speed with an air-actuated rheostat in the AC-DC drive motor system. All instrument components are grouped together in a completely enclosed system which insures ease of installation, simplicity of maintenance, and protection from liquor, stock, and wash-up hose damage.

Flue gases are passed through two wet-bottom precipitators of 140,000 cfm capacity each, which are integrated with the black liquor system.

The concentrated liquor is sprayed into two recovery furnaces. These have a designed capacity of 900,000 lb. of dry solids per day and are rated at 950 psi, with 865 psi and 825° F. at the superheater outlet.

Green liquor, containing dissolved smelt from the recovery furnaces, is passed through a continuous tray clarifier.

The 40- by 24-ft. green liquor clarifier and the 26- by 15-ft. dregs washer are of the new unit compartment design recently adopted as standard equipment units of the recovery system.

Green liquor is fed at the rate of 470 gpm to a 7- by 50-ft rotary slaker

driven by a 20-hp motor and operating at 4 rpm.

From the slaker the mixture flows by gravity to four 15- by 10-ft causticizers. The white liquor is then pumped to a 35- by 24-ft. four-compartment clarifier. From the clarifier the clear liquor goes to two 200,000-gal. storage tanks.

The sludge is washed, filtered and conveyed by a screw type kiln feeder to two 10- by 11- by 175-ft. oil-burning kilns. The kilns' output is 110-120 tons of 82-86 per cent calcium oxide per day.

Any dust from the lime kiln flue gas is passed through a water scrubber, trapped, and fed back into the system.

Make-up salt cake, in powdered form, is fed from hoppers by rotary feeders into an "Airstream" system and conveyed to a Whirl-clone in the recovery boiler building. The pneumatic conveying system is capable of handling 10 tons of salt cake per hour.

Administration: (l to r, seated) R. J. Kelly, industrial relations manager; E. V. McSwiney, assistant controller; Herbert A. Kidd, vice president and general manager; R. J. Schmieder, purchasing agent; N. R. Harding, woodlands manager; (standing) D. F. Black Jr., assistant industrial relations manager; M. O. Small, senior accountant and office manager, and H. B. Mathias, wood procurement supervisor

Pulp washing

From the blow-tanks the pulp is pumped at 4 per cent consistency by two 40-ft. head and 2000-gpm pumps to two lines of claflin refiners. From here it goes at 1.5 per cent consistency to eight 11½- by 1-1/3-ft. valveless vacuum washers arranged in four units to each of two lines, rated at 325 tons per line. The washers, with all steel construction and intermediate single rotor submerged repulpers and two 18-in. final repulpers, are operated from a push-button panel.

The two hoods over the washer units are made of asbestos panels attached to frames by means of countersunk stainless steel bolts. The hoods are continuous except for three cutouts on the front side for walkways across the washers.

The washer drums are 11½ ft. in diameter by 16 ft. long and are covered with stainless steel wire cloth having 40 mesh to the inch.

From the washers the clean pulp is conveyed to a Semtile storage chest which holds about 20 tons of fiber at 4 per cent consistency.

Two diaphragm metering pumps—made of 316 stainless, Hasteloy C and Kel-F plastic—measure 66° Be sulfuric acid into the pulp system to maintain the desired pH values.

Pulp screening

From the washed stock chest, the pulp is diluted to about 1 per cent consistency and pumped by a 5000-gpm pump to seven primary and three secondary centrifugal screens, each equipped with (1) six fresh water showers operating at a constant pressure and (2) an ammeter on each screen drive to indicate stock load. The screened stock is passed over two (9½- by 16-ft., 75% submergence) valveless vacuum deckers which it leaves at 8 per cent consistency *en route* to a Semtile storage chest. In the storage chests the pulp is diluted to 4 per cent consistency by the addition of white water from the paper machine.

Pulp refining

For primary refining, the stock is pumped through ten 48-in. disc refiners, each powered by a 500-hp synchronous motor. The refiners are constructed of stainless steel at all points of contact with the pulp. To reduce operating costs and to permit the mill to establish regular schedules for disc maintenance, the refiners are equipped with re-machinable stainless steel discs. Refiner control is by means of a hydraulic system with a positive mechanical lock. The 48-in. units are installed to refine both primary and secondary headbox pulp. The refined stock is stored in a 47-ft. long, 18 ft. wide, and 16½-ft. Semtile refined stock storage chest.

The paper machine

The 2000-fpm machine, with a designed daily capacity of 650 tons, features a pressurized headbox, a 252-in. wire, two regular presses and one inverse press, five dryer sections with a total of 86 five-ft. diameter rolls operated at 145 lb. pressure and 300°F., a breaker stack, and two calender stacks separated by three additional dryer rolls.

The paper machine is driven through differential drive units by a 3000-hp steam turbine. The differential drive mechanically locks the various sections of the machine together for positive control of draws.

Stock is supplied through a cross flow distributor to the pressurized headbox by a 28,000-gpm fan pump, and air pressure in the headbox is maintained by means of a liquid packing ring-type air compressor. A rubber-covered rectifier roll located at the throat of the distributor aids in keeping the stock fibers evenly dispersed as they flow into the headbox, and headless rectifier rolls control the approach flow to the slice. Both cross flow distributor and headbox are lined with stainless steel.

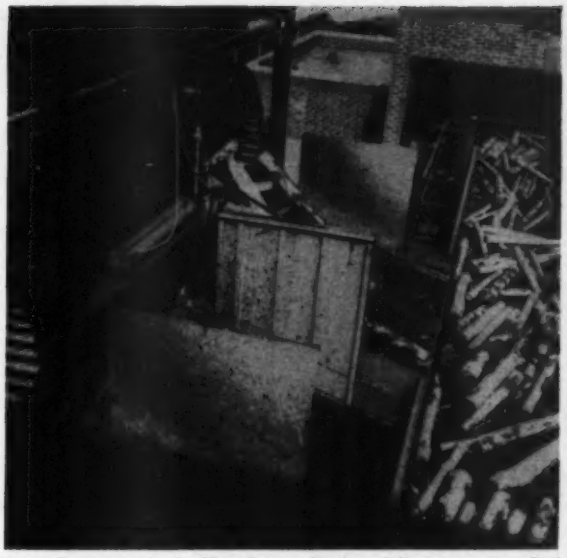
The press section consists of a rubber-covered first suction press, a rubber-covered second suction press, an inverse suction press, and a smoothing press. Constant nip pressure between press rolls is maintained by diaphragm-operated air loading equipment.

The dryer section is divided into five separate sections, with a breaker stack between the third and fourth section. All dryers are equipped with high-speed condensate remover and duplex steamfits which are arranged to permit on-the-run replacement of carbons.

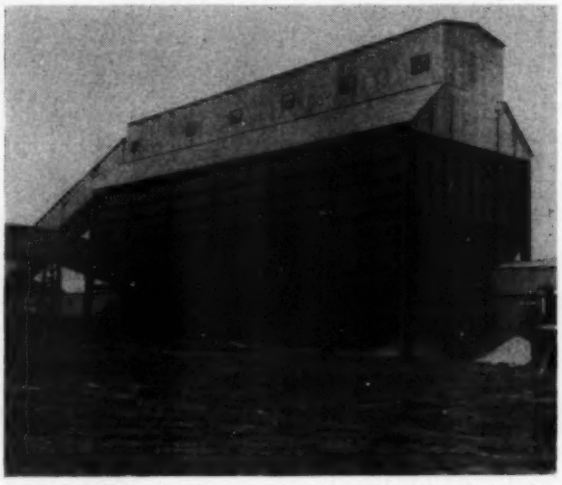
The sectionalizing of the dryers was made to permit wide variations in pressure, providing flexibility in drying variable weights and grades of container board. Differential pressures assuring effective and continuous condensate drainage of the dryers are automatically maintained, which offers operational advantages and increases the thermal efficiency of the system. There are six condensate receivers and one vacuum unit interconnected to provide the desired cascading effect.

Two compound vacuum pumps, capable of providing a vacuum of 20 in. mercury, are used on the suction

Woodyard operation showing Jervis B. Webb conveying system



View of 12- x 45-ft. barking drums, showing sliding gates, supplied by Fibre Making Processes Inc.



View of 1200-ton flat bottom chip bin equipped with traveling screw unloaders

Top view of Chicago Bridge & Iron Co. digesters with Ross Engineering asbestos panel hood

couch roll, and another compound vacuum pump creates the vacuum on the first and second presses.

A single-stage vacuum pump, capable of creating a vacuum of about 12 in. mercury, is used with the inverse press, and a similar pump operates the wire suction boxes and the Vickery felt conditioners.

Each of the Vickery felt conditioners, operating on three of the press felts at this mill, is equipped with four jordan-type vacuum boxes and with high-speed gear boxes to provide the correct conditioner drive and keep the felt constantly clean and open.

The hood over the paper machine is of the open type with asbestos panel removable sections. The 15 Axiflo exhaust fans have an air handling capacity of more than 1,000,000 CFM.

Calenders are of the twin stack open side design. Each of the stacks is equipped with a 36- by 242-in. "Farreloy" bottom roll and five 18- by 242 in. "Farreloy" intermediate rolls.

The 5000-fpm Model "L" winder is equipped with motor-driven roll ejector, shear slitters, and driven rider roll. These features—coupled with automatic shaft puller, overhead shaft transfer, and roll lining table—reduce manual handling to a minimum.

Special features incorporated in the paper machine that are contributing to increased productivity are:

(1) Drying capacity is improved by the unique pocket created through locating the top felt rolls higher in the frame. In this connection a new type streamlined outlet air nozzle was installed.

(2) The installation of the inverse press results in an improvement of finish as well as Mullen in the paper sheet.

(3) Auxiliary motors were installed to drive the felt rolls, which resulted in considerable increase of felt life.

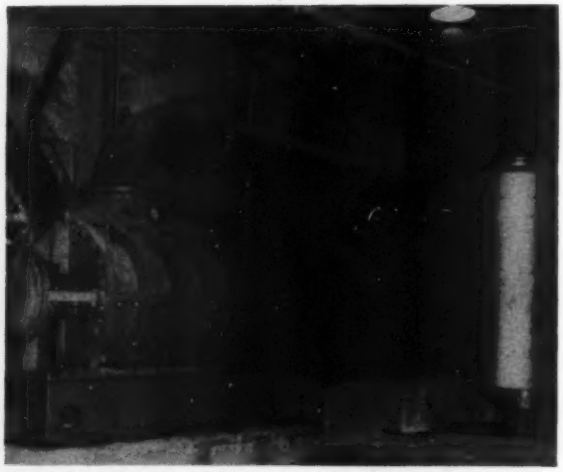
(4) Maximum separation of foam and air in the saveall is accomplished by means of valve-equipped downspouts which discharge below the water level in the Semplate lined wire pit. All flow from the saveall is directed toward the couch pit, where foam and excess water are skimmed off.

(5) Calender cooling, which takes care of two sets of calenders, is accomplished by having the outlet nozzles swivel so that air can be directed in any position along the calender roll.

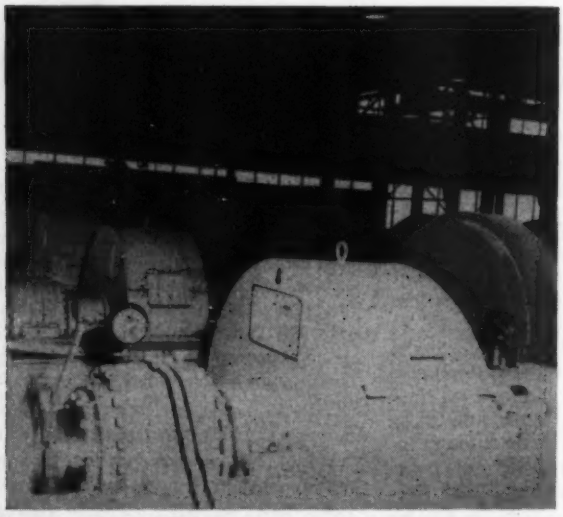
Top view of Swenson Evaporator Co. sextuple effect evaporators with counter-current barometric condensers

View of Allis-Chalmers Mfg. Co. 10- by 11- by 175-ft. lime kilns and lime slaking operation

Brown stock valveless washers supplied by Improved Machinery Inc. and Ross Engineering asbestos hoods



View of Roots-Connersville Blower vacuum pump



View of Sutherland Refiner Co. 48-in. disk refiners constructed of stainless steel at all parts of contact with the pulp

Paper rolls on Jervis B. Webb slat conveyor. A lowerator discharges them by a selector mechanism to shipping dock or storage

Roll handling system

The roll handling conveyor system is made up of six separate units and is 483 ft. long. It is designed to carry a maximum size roll of 6 ft. diameter by 10 ft. long weighing 10,000 lb.

After the rolls are cut and glued they are pushed onto the roller flight conveyor which transports them to the first stop, where the banding operator releases them, one at a time, to the slat conveyor for the banding operation.

The banded rolls are released, one at a time, to the roller flight conveyor mounted on a platform for weighing.

After the rolls are weighed and stenciled, they are fed to a slat conveyor which transports them to a lowerator, which discharges them by a selector mechanism to storage inside the building or *via* a slat conveyor to the shipping dock.

The entire system was designed with the view to increasing efficiency and reduce manual handling to a minimum.

Ventilating and heating

The heating and ventilating units cover the entire paper machine roof area through huge Silentvane fans and a system of distributing duct work to special diffuser outlet heads, directing the air upward against the roof.

Eight air make-up units are located in strategic points in the mill so that they can be used for both tempering the air in the winter and cooling it in the summer. Air flow is adjusted by a double set of louvres on the outlet side so that the air can be thoroughly diffused without any appreciable blow in any direction.

Power supply

Two chemical recovery furnaces have a design capacity of 900,000 lb. of dry solids per day, with a combined steam production capacity of 300,000 lb. per hour. They are equipped with an automatic sequential steam soot-blowing system, which is air motor-driven with air control. This system includes 20 long-travel retractable units and 32 rotating units.

Two pulverized coal-fired power boilers, arranged for alternate firing of bunker "C" oil and natural gas and equipped with Elesco Super Heaters, have a combined steam-producing capacity of 300,000 lb. per hour. The steam soot-blowing system of these boilers consists of 12 air motor-driven rotating units which are controlled by individual push buttons.

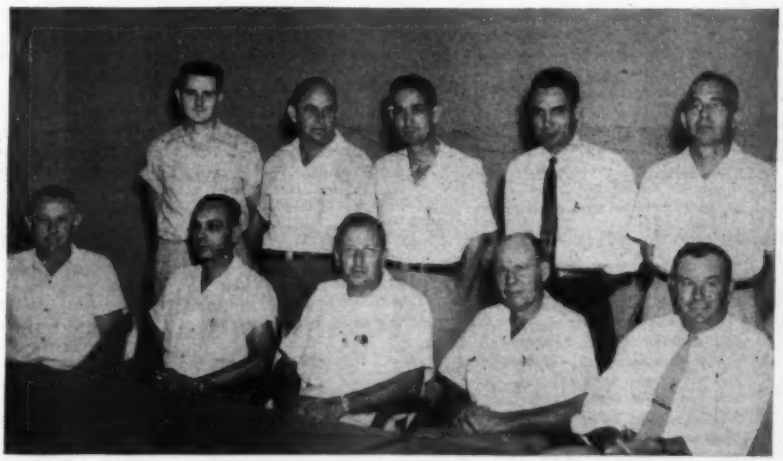
The power boilers are further equipped with two bowl mills per boiler for pulverizing Alabama bituminous coal. The capacity of each bowl mill is 10,100 lb. of coal per hour.

A bark-burning boiler, equipped to burn pulverized coal, bunker "C" oil, or natural gas in addition to bark, is rated at 150,000 lb. of steam per hour. A four-cell furnace is placed under the boiler for bark firing. A five-pass tubular air heater is used for heat recovery, and the interbank super heater has a damper control for super heater temperature. A coal pulverizer, identical to those on the power boilers, is used on this boiler for coal burning.

The fly ashes from the stack, boiler, passes, and dust collector hoppers are removed through an enclosed pipe line by means of a pneumatic system with water jet exhauster, discharging into an air separator. The air separator vents off the conveying air, while the mixture of water and fly ashes flows by gravity to the fill area through the same pipe line which handles the furnace bottom ash.

Water treatment

The water treating plant for clarification of Coosa River water has a capacity of 25,000,000 gallons per day. The plant includes four rectangular Clariflow units installed in concrete tanks 170 ft. long by 22 ft. wide by 20-ft average water depth. The turpidity of the raw water, varying from 50 to 1000 parts per million is reduced in these units to about five parts per million.



Production: (l to r, seated) A. D. Simpson, power superintendent; A. J. Parrino, paper mill superintendent; Lawrence F. Crowder, general superintendent; J. A. Whelan, pulp mill superintendent; D. H. Jones, master mechanic; (standing) G. W. Reynolds, chief engineer; M. D. Sandlin, chief chemist; E. W. Clark, chief meter man; J. F. Quinn, wood supervisor, and J. S. Kirkland, chief electrician

An efficient ash-handling system is designed to serve the two power boilers and the bark-burning boiler. The bottom ashes are handled by a hydraulic system, transporting them through a pipe line into a water ejector. From the water ejector the ashes are transported to an enclosed pipe line system, approximately 300 ft., to a fill area.

An automatic sprinkler system includes a wet pipe sprinkler system for the machinery room, refiner room, shops and stores building, oil storage, maintenance building, machine hoods, and office; and a dry pipe sprinkler system in chip bins, chipper room, chip and bark conveyor, bark storage bins, and digester loft.

Principal equipment and supplies for the Rome Kraft mill

Agitators, blow tank 42" — 48"	Improved Machinery Inc.
Agitators (8), five 60" and three 54" single channel type	Improved Machinery Inc.
Air compressors	Worthington Corp.
Air make-up units (8)	J. O. Ross Engineering Corp.
Ash handling system	United Conveyor Corp.
Bark burning boiler (1), 150,000 lb. steam/hr.	Combustion Engineering Inc.
Barking drums (2), 12' x 45' with sliding gates	Fibre Making Processes Inc.
Boiler chemical feed water treatment	Worthington Corp.
Boilers (5), two power, two recovery, and one bark burning	Combustion Engineering Inc.
Broke beater	Shartle Bros. Machine Div., Black-Clawson Co.
Brown stock washers (8), 11½' x 1 1/3' valveless	Improved Machinery Inc.

(Continued on next page)

Brown stock washer hoods (2) ..... J. O. Ross Engineering Corp.
Cable, electric ..... Okonite Co.
Calender rolls (12), 36" x 242" and 18" x 242" Farreloy ..... Farrel-Birmingham Co. Inc.
Calender stacks (2), open side design with 3 paper dryer rolls between ..... Beloit Iron Works
Calender air cooling supply unit ..... J. O. Ross Engineering Corp.
Causticizers (4), 15' x 10' ..... Dorr-Oliver Inc.
Chemical recovery furnaces (2), 950 psi ..... Combustion Engineering Inc.
Chippers (2), 10-knife with "V" spout ..... D. J. Murray Mfg. Co.
Chip bin screw unloaders (3), rotating and transversing ..... Jervis B. Webb Co.
Chlorinators (2), Type A-586 (2000 lb.) and A-419 (10 lb./day) ..... Wallace & Tiernan Inc.
Circulating and condensate system on paper machine ..... Ross Midwest Fulton Corp.
Centrifugal pulp screens (10), No. 4 ..... Improved Machinery Inc.
Coal pulverizers (3), Raymond type (10,000 lb./hr.) ..... Combustion Engineering Inc.
Consistency regulators (2), pressure type ..... DeZurik Shower Co.
Consistency regulators ..... Trimbey Machines Inc.
Control equipment ..... Fisher Governor Co.
Controls (40), for synchronous and induction motors ..... Electric Machinery Mfg. Co.
Conveyor belting ..... Goodyear Tire & Rubber Co.
Conveyors, log-handling, bark, chip, coal and roll handling ..... Jervis B. Webb Co.
Clarifier (1), white liquor 4-compartments ..... Dorr-Oliver Inc.
Clarifier (1), green liquor unit compartment ..... Dorr-Oliver Inc.
Cranes, electrical bridge ..... Northern Engineering Works Whiting Corp.
Crane (1), paper machine reel, 20-ton double hook ..... Euclid Crane & Hoist Co.
Deckers (2), 9½' x 16' valveless vacuum ..... Improved Machinery Inc.
Digester blow valves (8), 12" seatless ..... Yarnall-Waring Co.
Digesters (8), each 60-ton capacity ..... Chicago Bridge & Iron Co.
Differential drive units with separate and individual lubrication ..... Beloit Iron Works
Digester hood, asbestos panel construction ..... J. O. Ross Engineering Corp.
Dregs washer (1), unit compartment ..... Dorr-Oliver Inc.
Electrical equipment (motors, transformers, control centers, switchgear) ..... Westinghouse Electric Corp.
Evaporators (2), sextuple effect with barometric condenser ..... Swenson Evaporator Co.
Felt conditioners (3), Vickery with jordan type vacuum boxes and high-speed drives ..... Bird Machine Co.
Felt air supply units (2) ..... J. O. Ross Engineering Corp.
Fire protection system, woodyard ..... Crawford & Slaten Co.
Fire sprinkling systems (2), wet and dry pipe ..... Grinnell Co.
Gear reducers (48) ..... Falk Corp. W. A. Jones Machine & Foundry
Generator, stand-by diesel ..... Cooper-Bessemer Corp.
Generators (3), two extraction turbines (5000 kw) and one extraction turbine (7500 kw) ..... General Electric Co.
Headbox (1), pressurized with cross flow distributor, stainless steel lined ..... Beloit Iron Works
Heat exchange units (3) and continuous blow-off accessories ..... Graver Water Conditioning Co.
Heating and ventilating units (4) with Silentvane fans ..... J. O. Ross Engineering Corp.
Instrumentation ..... Foxboro Co., Mason-Neilan Regulator Co. Bowers Regulator Co., Republic Flow Meters Co.
Instrument panels for black liquor evaporators, digester liquor measurement, washers, rotary screens, refining, paper machine, causticizing, lime slaking, water treatment and steam distribution ..... Foxboro Co.
Knife grinder (1), Model AK with hydraulic traveling wheel head ..... Hanchett Mfg. Co.
Lime handling system ..... Continental Gin Co.
Lime kiln refractory ..... Harbison-Walker Refractories Co.
Lime kilns (2), 10' x 11' x 175', combination oil and gas burning. 2400°F ..... Allis-Chalmers Mfg. Co.
Lime mud filters (2), 8' x 6', special top feed inlet ..... Improved Machinery Inc.
Lime mud washer (1) four-compartments with agitator ..... Dorr-Oliver Inc.
Lime slaker (1), 7' x 50' rotary, 4 rpm ..... Allis-Chalmers Mfg. Co.
Paper machine, 252-in. 2000-fpm fourdrinier board, five section dryer with 86 five-ft. diameter rolls ..... Beloit Iron Works
Paper machine drive turbine, 3000-hp. steam ..... Westinghouse Electric Corp.
Paper machine helper drive, with 20 motors ..... General Electric Co.
Paper machine hood, open type with 15 Axiflo exhaust fans ..... J. O. Ross Engineering Corp.
Paper machine oil filtering system ..... Bowser Inc.
Pipe, stainless steel, troughs and tanks ..... Bristol Metal Products Corp.
Power boilers (2), 150,000 lb. steam/hr. ..... Combustion Engineering Inc.
Precipitators (2), wet bottom, 140,000 cfm each ..... Research-Cottrell Inc.
Pulp press (1), rejects continuous ..... Jackson & Church Co.
Pumps (60), including fan pump ..... Ingersoll-Rand Co.
Pumps ..... Duriron Co., Layne-Atlantic Co., Milton Roy Co. Viking Pump Co., Worthington Corp.
Pumps, diaphragm (6), 2 No. 2 V-type and 4 No. 6 W-type ..... Dorr-Oliver Inc.
Pumps, fire system ..... Fairbanks, Morse & Co.
Pumps (2), Pulsafeeder chemical, CPS-1 and CPS-2 models ..... Lapp Insulator Co.
Pumps (4), one L-3 air compressor, one L-5 vacuum and two L-7 vacuum ..... Nash Engineering Co.
Pumps, vacuum (5), two single-stage and three two-component ..... Roots-Connersville Blower Co.
Reel, designed for constant roll hardness ..... Beloit Iron Works
Refiners (10), 48" disk ..... Sutherland Refiner Co.
Refiners, hot stock ..... Hermann Mfg. Co.
River intake screens ..... Link-Belt Co.
Roll grinder (1), two-wheel 42" x 304" ..... Farrell-Birmingham Co. Inc.
Roll handling Conveyor system ..... Jervis B. Webb Co.
Ross-Grewin units (2), specially designed ..... J. O. Ross Engineering Corp.
Salt cake handling system (1), "Airstream" 10 tons/hr. ..... Dracco Corp.
Sanitary water system ..... Equipment Inc.
Saveall (1), 11½' x 16' valveless vacuum ..... Improved Machinery Inc.
Scales, chip weightometer ..... Merrick Scale Co.
Scales, coal handling ..... Richardson Scale Co.
Scales, roll handling ..... Toledo Scale Co.
Shuttle conveyor (1) ..... Jervis B. Webb Co.
Sizing system ..... Hercules Powder Co.
Soap skimmer ..... Chicago Bridge & Iron Co.
Soot blowing systems ..... Diamond Power Specialty Co.
Stacking unit (1), 300' long and 50 cords/hr. ..... Jervis B. Webb Co.
Suction box conditioner ..... Eastwood-Nealley Corp.
Synchronous motors (24), 200-600 hp ..... Electric Machinery Mfg. Co.
Tanks ..... Chicago Bridge & Iron Co. J. J. Finnigan Co. Inc.
Tanks, wooden, 10,000-gal. capacity ..... W. E. Caldwell Co.
Thermometers, gauges and relief valves ..... Manning, Maxwell & Moore Inc.
Thermostats (16), Limitem for heating and ventilating units ..... Powers Regulator Co.
Tile chests (6) Semtile—washed stock, deckered stock, high stock, refined stock, and machine flat box seal pit ..... Stebbins Engineering & Mfg. Co.
Turbine condenser ..... Lummus Co.
Turpentine condenser ..... Lummus Co.
Unwinding stand (1), with air-operated brakes and adjustments to align reel spools ..... Beloit Iron Works
Valves (16), 2" Flowrite for heating and ventilating system ..... Powers Regulator Co.
Valves ..... Chapman Valve Co., Crane Co., Walworth Co.
Valves (15), 1½" and 2" boiler blow-off ..... Yarnall-Waring Co.
Waco filter, 6½' x 14' for black liquor ..... Improved Machinery Inc.
Water treatment units (4), Clariflow type ..... Walker Process Equipment Co.
Winder (1), Model L designed for speeds up to 5000 fpm ..... Beloit Iron Works
Winder drive, speed regulated with amplidyne control ..... General Electric Co.

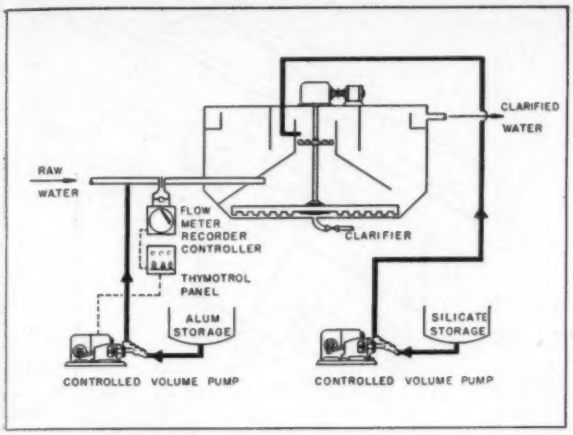


Fig. 1—Raw water clarification

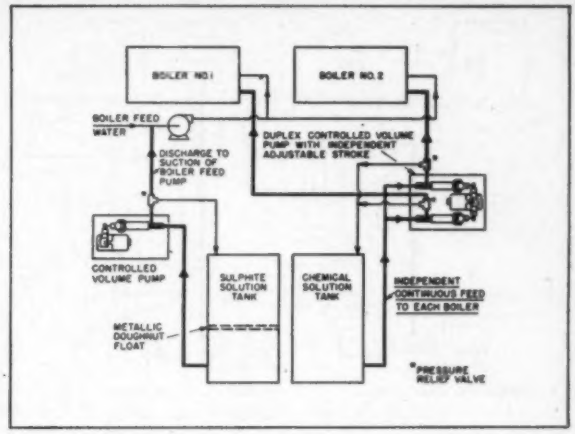


Fig. 2—Boiler feedwater treatment; duplex pump at right is used to feed sodium hydroxide

New flow control approach to water treatment

WILLIAM W. DRAKE and G. E. SHAFFER Jr.
Milton Roy Co.

▶ Accurate metering of water-treating chemicals is essential for efficient and economic plant operation

▶ This article describes problems and the application of constant volume pumps in raw boiler and process water treatments; slime and foam control; waste treatment; and white water recovery

ANYWHERE FROM 600 to 180,000 gallons of water may be required to process one ton of paper, depending on the type of product processed, and upon the efficiency of recovery methods employed.

Once raw water enters the mill for process and auxiliary use, it must be treated with a wide variety of chemicals to render it most satisfactory for each particular use. Since most of these many water-treating chemicals are expensive, it is fortunate that they are employed in relatively small amounts. However, accurate metering of water-treating chemicals is essential for efficient and economic plant operation. Over-treatment means a costly waste of chemicals, whereas under-treatment means improper treatment and consequent loss of product quality. Beyond this, improperly treated boiler water, for example, can greatly shorten boiler life, while undertreated white water can mean the loss of usable fibers to waste.

In the various water treating processes employed for conditioning raw and process waters, accurate control of chemical additives is effected by means of controlled volume pumps functioning as flow controllers, ratio controllers or final control elements.

Typical Controlled Volume Pumps in Paper Mill Water Treating Systems

Model	Capacity	Additive	Reason
TMD1-57-74R	218 gph	Alum	Raw water clarification
MD1-22-36	6.8 gph	Silicate	Clarification aid
GMD1-24-36	3.4 gph	Germicide	Slime control
H20-2-24-74	3.4 gph	Antifoam	Foam control
MD1-25-58	23 gph	Caustic	Waste sulfite neutralization
VMD2-518-84R	2 liquid ends 59 gph 138 gph	 Alum Water	pH control in saveall system
MD1-24-58	5 gph	Glue	Coagulant aid
MD1-24-36	3.4 gph	Sulfite	Oxygen scavenging
MD1-32-36	7.3 gph at 375 psi	Phosphate	Boiler scale prevention

Raw water preparation

Usually a clarification operation will render river water suitable for most process applications, although other treatments are occasionally necessary. Fig. 1 illustrates a clarification system used to prepare 8000 gallons per minute of make-up water for use in process and power installations of a large Wisconsin paper mill. This system uses one of the largest controlled volume pumps that has ever been applied to water treating problems.

In operation, an orifice-type flow meter controller is mounted in the raw water inlet line. The linear electric control signal (proportional to raw water flow rate) from this meter is transmitted to a Thymotrol* panel. The panel automatically varies the speed of the controlled volume alum pump in direct response to the flow meter controller signal. Ratio of alum to raw water is thereby maintained constant despite any fluctuations in raw water flow.

Substantial savings in chemical costs which result in large clarification systems of this type easily justify the use of this precise control technique. In the specific installation cited, for example, the controlled volume pump meters a maximum of 218 gallons of alum per hour to the clarifier line.

In contrast, the sodium silicate concentration in this clarification system

*General Electric Co.

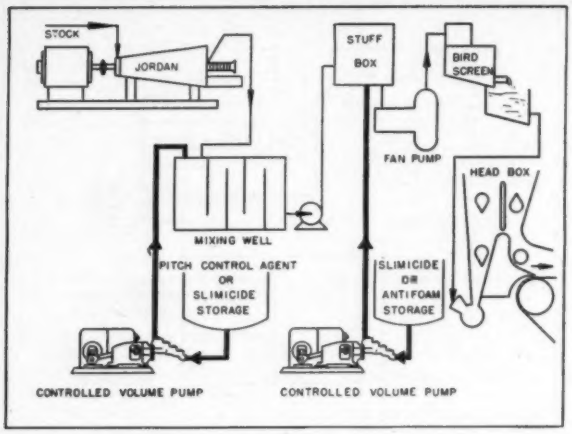


Fig. 3—Typical system for control of pitch, slime or foam

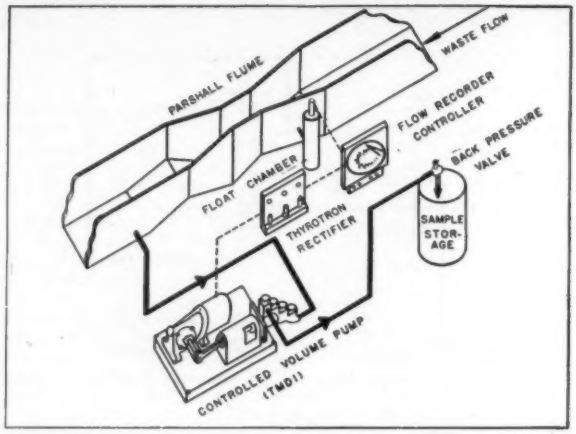


Fig. 4—Waste stream sampling; a continuous sample is drawn in proportion to waste flow rates

is accurately maintained with a constant-speed controlled volume pump which handles a maximum of only 7.3 gallons per hour. Since the silicate reacts more slowly than alum, overall proportionality is sufficient to maintain the treatment level within economic limits.

The capacities of both the alum and silicate controlled volume pumps are variable from 0 to 100 per cent of maximum through stroke length adjustment. This makes it possible to quickly vary the treatment level (chemical to water ratio) as raw water conditions demand.

Boiler water treatment

Clarified water, although usually satisfactory for general process use, requires further treatment to prepare it for steam and power generation. Excessive dissolved solids and gases in boiler feed water can quickly concentrate in a boiler system and produce disastrous results. Softening, demineralization and aeration techniques, therefore, are standard preliminary treatments that are applied to boiler feed water.

After this preliminary treatment, chemical additives are used to remove small quantities of residual contaminants. Controlled volume pumps continuously add sodium sulfite solution to the storage tank of the deaerating heater in order to remove residual oxygen (Fig. 2). This treatment completely removes the last traces of dissolved oxygen and prevents corrosion and pitting of boiler feed pumps, boiler tubes and economizers. High-pressure controlled volume pumps also inject sodium phosphates directly into the boiler drum. These chemicals react with the residual calcium salts and cause them to precipitate as sludge. Without this treatment the calcium would form scale deposits on boiler tubes, decreasing boiler efficiency.

A third additive usually used in boiler feed water treatment, sodium hydroxide, maintains boiler water alkalinity at the required level and causes the desired hardness removal reactions to occur. In small installations, caustic addition is economically effected by blending excess caustic with either the sulfite or phosphate feed. However, in larger installations, as illustrated in Fig. 2, a third controlled volume pump is used to give closer control of boiler water treatment.

Process water treatment

Several water treatment problems, such as inhibition or removal of pitch, slime, foam, and scale are inherent in all phases of papermaking. Pitch is one of the natural products resulting from mechanical or chemical pulping of wood. If allowed to go unchecked, pitch would soon clog machinery, spot paper, and ruin paper machine felts and wires. Controlled volume pumps, adding small quantities of dispersing agents such as naphthalene sulfonic acid salts, phosphates and other organic compounds, help to disperse or solubilize pitch until it can be removed conveniently. Since pitch usually follows the pulp completely through the paper process, dispersing agent injection may be required at several points. The chief advantage of controlled volume pumps for this service is their ability to accurately control the small quantity of additive and prevent waste of costly chemicals. A typical installation is shown in Fig. 3.

Slime control

Ground pulp forms an excellent medium for slime growth. Although the dispersing agents used for pitch control are also helpful in limiting slime, additional treatment is usually necessary. Controlled volume pumps are used to inject periodically organic mercury compounds and highly chlorinated aromatics during processing to discourage or prevent slime growth. The pumps help to save expensive chemical agents while accurately maintaining the slimicide concentration at an effective level. In addition, since slimicides are usually highly toxic, an added advantage is the ability of the pump to meter concentrated reagents from the original container accurately, thus reducing handling and the attendant dangers.

Foam control

Foam is probably one of the most annoying problems a papermaker has. This problem is solved simply by the controlled volume pumping of defoaming agents. Controlled volume pumps accurately maintain the defoamer concentration within the most effective limits and prevent waste of reagents as well as loss of product.

Waste treatment and recovery processes

Each ton of paper processed requires an average of 175,000 gallons of water somewhere in its production. In order to use this water economically, as much of it as possible is recycled. Water losses are usually limited to streams containing high percentages of waste chemicals which cannot profitably be recycled.

The waste chemical streams are divided into two classes: waste disposal streams and chemical recovery streams. If municipal sewage systems are used to dispose of waste, premium rates are charged depending on corrosion and contamination levels. The sewage sampling system in Fig. 4 uses a

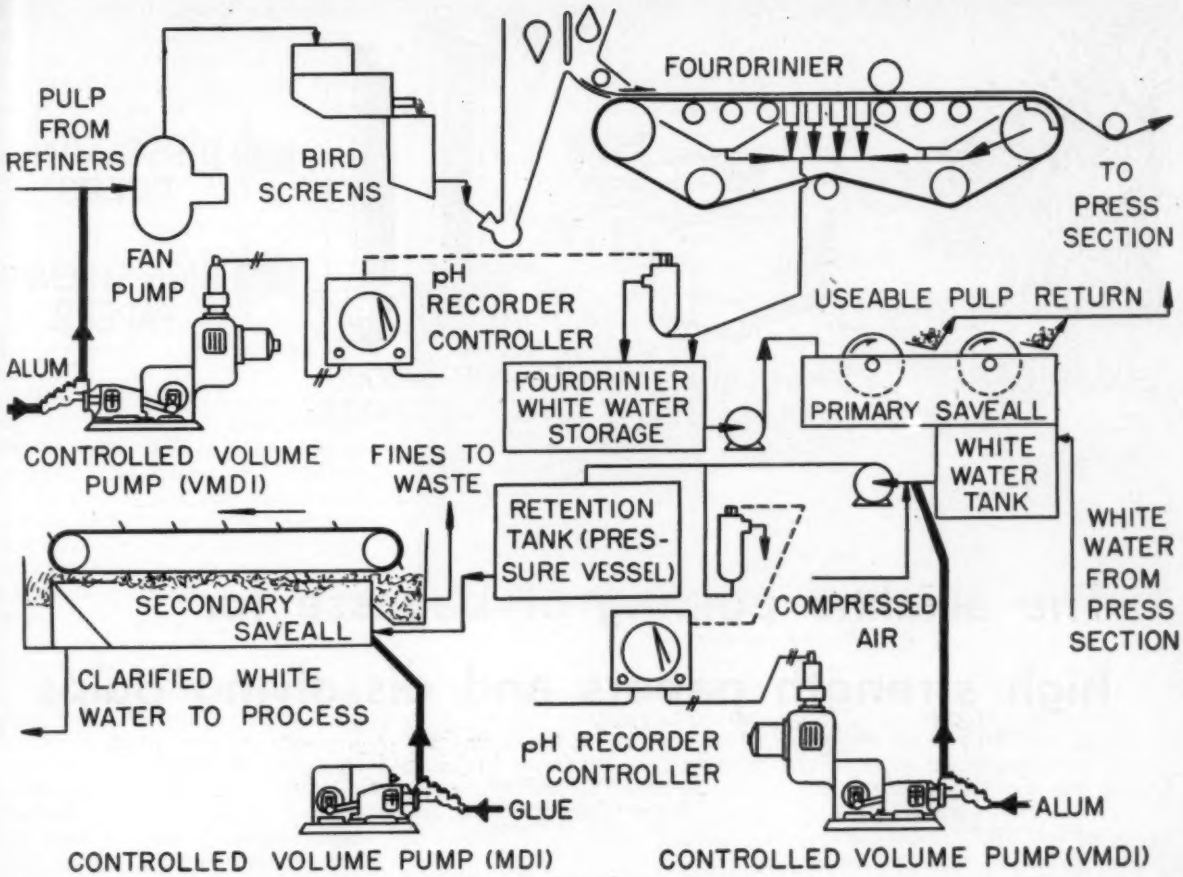


Fig. 5—White water recovery processes; alum pump at lower right is shown with one liquid end; duplex pump (two liquid ends) can be used to dilute alum with water automatically, thus eliminating large dilute alum storage tanks

controlled volume pump to withdraw a continuous sample of waste in proportion to sewage flow rate. Usually, the reduction in sewage premium more than compensates for the sampling system and subsequent analysis.

Where waste waer is returned to a river or stream it is clarified and neutralized to protect fish and maintain potability. The same type of clarifier used on the original raw water is often used for this service. One additional controlled volume pump is often employed to adjust the effluent pH to 7.0. In large systems a constant-speed pump is usually sufficient. Where highly acid waste is discarded, automatic pH control systems may be necessary.

Efficient chemical and water recovery systems often mean the difference between profit loss or gain in paper processing. The chemical content of a processing stream may often be several times the pulp weight, and only efficient recovery systems can limit losses to the economic minimum. Controlled volume pumps are used in chemical recovery systems primarily for pH control and related problems. One controlled volume pump adds 23 gallons per hour of concentrated caustic to concentrate sulfite waste (53 per cent) to neutralize it prior to resale as a linoleum paste constituent. In another application a controlled volume pump continuously meters milk of lime to green liquor from sulfate recovery processes to make white liquor for the digesters.

White water recovery

In paper mills the most important water recovery process is the continuous clarification of white water and its preparation for recycle. The degree of control exercised at this step is one of the most influential factors in the process. Fig. 5 shows a typical white water recovery system using controlled volume pumps as final control elements.

The pH of the white water from the fourdrinier is adjusted through automatic alum addition at the fan pump. Since the pH is adjusted to the most efficient fiber flocculation range, two purposes are served. First, sheet formation on the fourdrinier is closely controlled and, second, the maximum recovery of usable fibers at the saveall is promoted without including non-usable fines, which would weaken the final sheet. In mills processing only one type of paper, a constant speed controlled volume pump (replacing the pH control system in Fig. 5) continuously adds alum or sulfuric acid at the fan pump. Periodic laboratory analysis of the white water is usually sufficient in these cases to effect close pH control.

After primary recovery of usable fibers, the white water and fines are sent to secondary recovery. An automatic pH control system readjusts the pH for efficient flocculation of fines in a flotation process. Compressed air, injected into the stream at the transfer pump, is released to the solution as fine bubbles in the secondary saveall. Glue added immediately before the saveall serves two purposes. It counteracts the effect of antifoam agents used prior to this step and promotes the formation of a tough adhering floc. The floc or froth is skimmed off the top of the saveall by an endless brush and the clarified white water is returned to process.

The alkaline pulping of bagasse for high strength papers and dissolving pulps

WILLIAM J. NOLAN
Pulp and Paper Laboratory
University of Florida

- **Pulps containing 95-96 per cent alpha cellulose are obtainable in 5 minutes cooking time at surprisingly low steam pressures**
- **Papermaking bagasse pulps show remarkably high burst, tensile, and folding strengths but are low in tear strength**

THE PROBLEM of processing sugar cane waste for the paper industry is very complex. In addition to the usual investigation of the pulping variables on the cellulosic raw material, the researcher is confronted with variations in the raw materials due to geographical location, differences in methods of harvesting and processing the cane before it becomes a papermaking raw material, and the actual physical separation of the components of the raw material prior to pulping. This last refers to the separation of the pith cells from the fibrous cellulose.

All of the research reported in this paper was based on Florida cane, grown in the neighborhood of Clewiston, Fla., as a source of raw material. A very small amount of work done two years ago on Philippine bagasse showed that the pulping conditions used in the cooks described herein result in about the same yield and chemical analysis of pulp from bagasse grown in the two regions.

The work under discussion will be divided into three parts for simplicity of presentation. The first section deals with separation of pith from fiber, the second part covers the pulping conditions explored for the preparation of high purity pulps for dissolving purposes, while the papermaking applications of bagasse are covered in the third section.

I—Separation of Pith From Fiber

Two types of bagasse were used in this study. The first material was prepared in the laboratory at the University of Florida from freshly cut cane. The cane was cut at a United States sugar plantation near Clewiston and transported overnight to the laboratory. The cane was chopped into lengths about 2 in. long and fed to a Jackson & Church 015 rotapulper, where the material was torn apart into individual fibers of substantially the same lengths as the cut cane. The shredded material was fed to a Jackson & Church ZM screw press, where the sugar juices were removed, resulting in a pressed cake of 40 per cent fiber.

The pressed pulp was mixed with dilute sugar juice in a second pass through the rotapulper. The mixture was then pressed again to 40 per cent fiber. The pressed cake was mixed with fresh water in a third rotapulper treatment, after which it was pressed for the third time to 40 per cent fiber. The juice extracted from this third press was used for dilution in the second mixing in the rotapulper. Thus, a counter-current washing system was developed in which 98 per cent of the sugar was extracted with a minimum of water dilution.

From the standpoint of bagasse utilization, this counter-current extraction process approached the ideal for preparation of fiber. The three passes through the rotapulper, due to the intense rubbing action involved, separated practically all the pith which had been attached to the cellulose fibers. The fibers were very long, almost 2 in. in length, with very little fiber breakage. The main problem of pith removal remained, however, because, even though the bonds between pith and fiber had been broken, the two components were still intimately mixed.

The second form of bagasse studied was dry, baled bagasse, obtained from the Clewiston mill of United States Sugar Co. This bagasse had been dried in a fire drier and was marketed as chicken litter. The material was quite dark in color and contained a large amount of dirt, carbon, and what appeared to be traces of caramelized sugar.

The dry bagasse was soaked overnight in hot water in an attempt to bring back the original flexibility of the fibers. The soaked bagasse was drained of excess moisture, then submitted to two and three passes through the rotapulper. It was found that this treatment broke the bonds between pith and fiber, just as had been done in the case of fresh cane. However, the resultant fibers were much shorter than when fresh cane was used—the fiber mixture varying in length from 2 in. to less than ¼ in. Fibers were much darker in color than the fibers from the fresh cane.

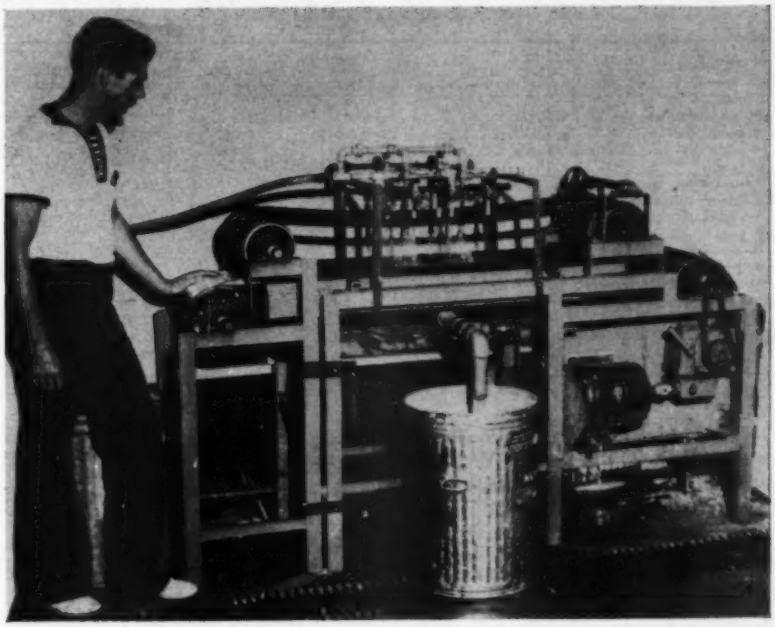


Fig. 1—Screen belt pith washer

A rough estimate of power cost was made for the rotapulper treatment. The bagasse can be processed in this manner for about 1 HP day per ton per pass, and the machine, when equipped with a 100-HP motor, should handle 75 to 100 tons of bagasse per day.

Screening operation

The first attempt at separation of pith from fiber consisted of the use of a flat screen similar to that used in the paper industry. The screen plates were milled with 18 cut (0.018-in.) slots. The mixture of pith and fiber was fed to the screen at 0.5 to 1.0 per cent consistency. About 60 per cent of the material was retained on the screen, 40 per cent passing through the slots.

The material held on the screen was mainly fiber but contained that fraction of the pith which was larger in diameter than 0.018 in. The fiber fraction could not be considered as having been satisfactorily depithed.

The fraction passing through the screen, called the pith fraction, con-

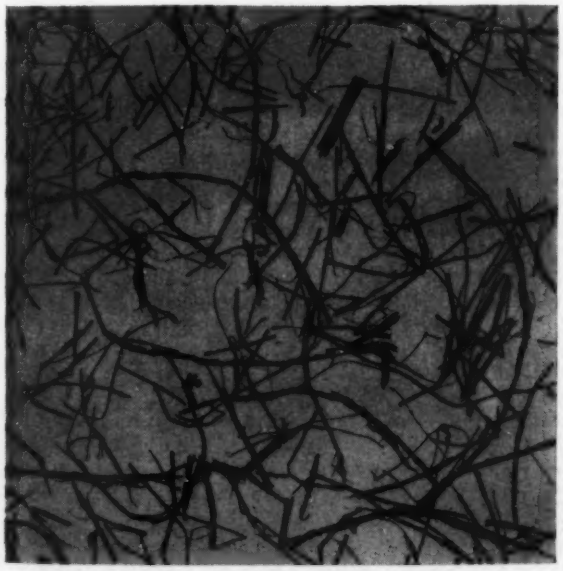


Fig. 2—Fiber fraction from belt washer

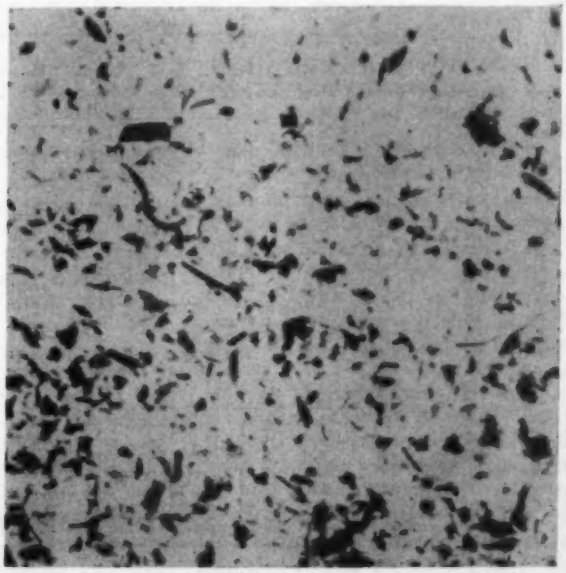


Fig. 3—Pith fraction from belt washer

Table I—Pith Removal From Bagasse Pith

Run No.	1	2	3	4
Belt Speed, Ft. per min.	4.2	4.2	12.6	12.6
1st pass				
Spray water, gal per hr.	159	225	173	270
Effluent consistency, % Solids	0.131	0.032	0.139	0.139
Weight of pith fraction, lb per hr.	1.314	0.605	2.000	3.110
2nd pass				
Spray water, gal per hr.	173	143	197	216
Effluent consistency, % Solids	0.022	0.021	0.058	0.043
Weight of pith fraction, lb per hr.	0.318	0.253	0.950	0.768
3rd pass				
Spray water, gal per hr.	---	130	---	174
Effluent consistency, % Solids	---	0.011	---	0.027
Weight of pith fraction, lb per hr.	---	0.123	---	0.387
Weight of washed fiber, lb per hr.	3.49	2.41	13.00	10.05
Total wgt. of pith fraction, lb per hr.	1.63	0.98	2.95	4.26
Fiber recovery, % of original bagasse	62.8	71.2	81.1	70.2
Total water used, gal per lb. fiber	95.2	206.5	28.5	65.7

tained a high percentage of short, broken fibers. It is estimated that this pith fraction, on a weight basis, contained over 50 per cent fiber.

In order to obtain a fiber fraction sufficiently free of pith to warrant pulping research, the fiber fraction was dried to 5-10 per cent moisture, then passed over a Day Ro-ball shaking screen, using 14 mesh window screen as a separation medium. The fibers were sufficiently interlaced so that very little of the long fibers were lost through the screen. The vibrating motion sifted practically all of the loose pith through the screen but, unfortunately, the very short fibers were also carried through. The material passing through the screen amounted to 10-15 per cent of the total weight fed to the screen. The over-all process would not be commercially practical, but it did result in a supply of very clean fiber for the pulping experiments.

Experimental pith-removing screen

The depithing problem was analyzed, taking into account all the properties of the pith-fiber mixture, and a machine was designed to take advantage of these properties as far as possible. First, a high proportion of the pith is always larger in diameter than the cross-section of most of the fiber. Second, if allowed to flow freely in water, part of the pith will come to the surface rather than pass through a screen because of the air held in some of the pith cells. Therefore, if a mechanism could be designed in which the fibers are held flat on the screen, the screen openings could be made large enough to permit passage of the largest particle of pith with no passage of fiber. Sufficient water should flow through the material so that the tendency of the wet pith to cling to the fiber, a very pronounced characteristic, will be overcome. The velocity of the water must be such that the buoyant pith will be carried along with the stream. The amount of water on the screen must be kept low enough so that there is no tendency for the fibers to orient themselves so that they can flow, edgewise, through the large screen openings.

An experimental machine was designed according to these principles, and a photograph of the laboratory model is shown in Fig. 1. A continuous belt, made of 14 mesh screen wire, is stretched between 8-in. diameter rolls, set about 5 ft. between centers. The screen belt is 12 in. wide. The peripheral speed of this belt can be varied between 3 and 15 fpm by means of the motor, speed reducer and sprockets shown at the lower right. Two deckle straps, made from rubber strips 1 in. by 1 in. in cross-section, ride on the top of the screen and are stretched between 8-in. guide rolls, 4 ft. between centers. A galvanized trough fits tightly under the wire to catch the material passing through the wire. A 1½-in. pipe is welded into the bottom of this trough and can be seen discharging into the galvanized can in front of the machine. Eight ¼-in. Sprayco nozzles supply water in the form of flat spray to the screen surface.

In operation, a mixture of wet pith and fiber, after two or three passes through the rotapulper, is fed to the

Table II—Pulping of Bagasse for High Purity Pulps

				Cooking Liquor				Yield	Pulp Analysis					
											Deg. of Polymerization		G. E. Brightness	
Cook No.	Depithing Method*	Steam Press psig	Cooking Time Min.	Conc. gm Na_2O per L.	Sulphidity %	Percent Chem. of dry Bagasse	Liquor Ratio %	% of Orig. Mat.	Lignin %	Pentosan %	unbleached	ClO_2 bleached	unbleached	ClO_2 bleached
816	none	80	5.0	81.2	25	319	42:1	35.1	2.7	3.8	1790	1805	31.7	64.5
814	A	50	5.0	81.2	25	319	42:1	48.2	2.4	5.1	-----	-----	-----	-----
815	A	80	5.0	81.2	25	319	42:1	48.6	1.6	2.7	2007	1963	49.0	71.2
858	B	80	5.0	80.4	25	190	25:1	50.2	1.4	4.5	1885	1855	41.8	72.4
859	B	80	7.5	80.4	25	190	25:1	49.3	0.9	4.4	1740	1655	45.5	74.4
860	B	80	10.0	80.0	25	190	25:1	48.7	1.1	4.5	1735	1625	44.7	76.2
892	B	80	5.0	80.8	25	316	42:0	48.6	---	3.1	1908	1716	47.7	77.8
893	B	80	10.0	80.8	25	316	42:0	47.6	---	1.5	1705	1552	51.1	79.1
894	B	80	15.0	80.8	25	316	42:0	46.6	---	---	1562	1432	50.9	79.3
884	B	80	15.0	80.2	25	479	64:1	47.7	---	3.7	1295	1310		61.6
885	B	80	20.0	80.2	25	479	64:1	47.2	---	2.6	1225	1230		60.8
886	B	80	5.0	80.0	0	480	64:1	47.8	---	3.4	1378	1345	50.4	78.2
887	B	80	10.0	80.0	0	480	64:1	47.5	---	2.7	1152	1082	54.2	72.2
888	B	80	15.0	80.0	0	480	64:1	47.2	---	2.6	1067	986	54.9	79.2
877	B	80	5.0	126.0	25	497	43:0	50.6	---	3.7	1395	1350	-----	60.3
878	B	80	7.5	126.0	25	497	43:0	49.0	---	3.8	1200	1150	-----	62.6
879	B	80	10.0	126.0	25	497	43:0	48.4	---	3.6	790	1060	-----	60.4
1050	C	80	7.5	79.7	25	316	42:1	46.4	---	---	1510	1490	45.9	67.6
1051	C	80	10.0	79.7	25	316	42:1	45.6	---	---	1424	1365	47.6	68.4
1047	C	125	5.0	79.7	25	316	42:1	46.1	---	---	1385	-----	48.3	-----
1048	C	125	7.5	79.7	25	316	42:1	45.1	---	---	1107	1075	50.5	67.7
1049	C	125	10.0	79.7	25	316	42:1	44.9	0.85	2.0	1000	970	52.0	69.2
1073	C	125	10.0	80.4	25	316	42:1	45.2	0.85	2.0	1060		53.0	

*Depithing method A. Fiber obtained from sugar extraction of fresh cane, followed by wet and dry screening for pith removal.
Depithing method B. Fiber obtained by hot water soaking of dry, baled bagasse, 2 passes through rotapulper, wet and dry screening for pith removal.
Depithing method C. Fiber obtained by hot water soaking of dry, baled bagasse, 2 passes through rotapulper, screen belt washing for pith removal.

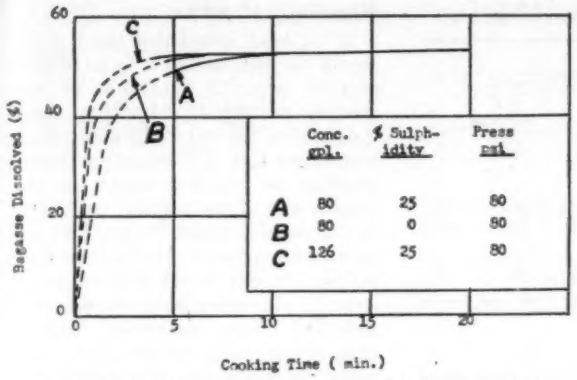


Fig. 4—Cooking curves depithed bagasse (dissolving grades)

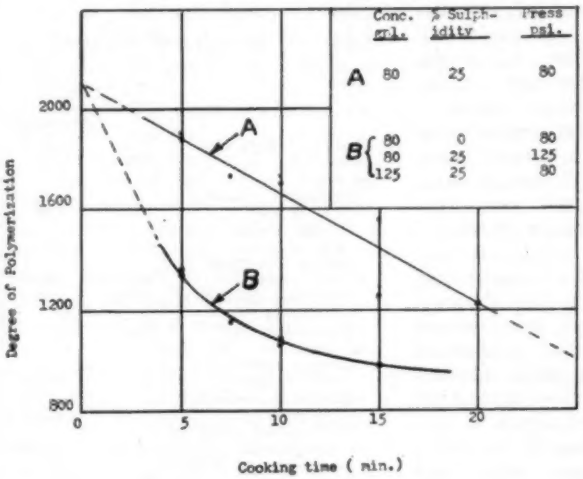
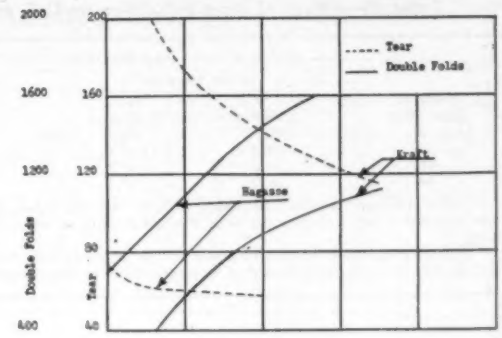


Fig. 5—D. P. of bagasse pulps



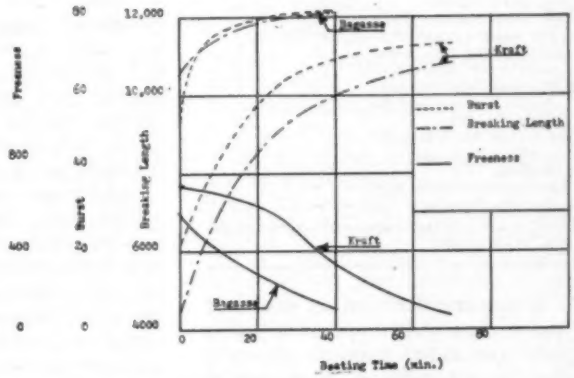


Fig. 6—Physical strength of bagasse pulps

screen belt, just ahead of the sprays. The discharge valve under the trough is adjusted so that there is a water layer about ½ in. deep on the screen surface, contained by the deckle straps. The mixture of pith and fiber is spread out evenly on the wire and travels through the sprays, which wash the pith through the wire, leaving the fibers on the screen surface. The washed fiber is picked off the end of the belt where the operator is seen. Pith is collected in the galvanized can in front of the machine.

The effective washing area on this machine is very small. The distance between the inner edges of the deckle straps is 9⅜ in., while the length of screen over which the sprays operate is 16 in. Operations have been carried out using one, two and three passes over the screen. A single pass does not give sufficient washing, while two passes result in a very clean separation which is not improved by a third pass over the machine. Operating data for the machine are shown in Table 1. Belt speeds of 4.2 and 12.6 fpm were used, in both 2 and 3 pass.

A photograph of the fiber resulting from two-pass washing is shown in Fig. 2. The longest fibers shown are about 2½ in. long. It can be seen that the free pith in the fiber fraction is negligible. The effectiveness with which the pith has been rubbed away from the fiber by two passes through the rotapulper can be seen by close inspection of the fibers. The occasional small lumps, seen faintly along the fiber edges, are all that remains of the original bond between pith and fiber.

Fig. 3 is a photograph of the pith fraction. The longest single, straight fiber seen near the center of the picture is actually about ⅛ in. long, giving a rough idea of actual particle sizes. It can be seen that the percentage of fiber in the pith fraction is very small.

From the data in Table I, it is estimated that bagasse, after two passes through the rotapulper, can be separated into pith and fiber—the fiber fraction being as clean as that shown in Fig. 2. The fiber recovery should amount to 70-80 per cent of the original bagasse. It should be possible to process 100 tons of clean fiber per day, on a continuous screen belt with an effective width of 25 ft. and a washing length of 53 ft. Belt speed should be about 126 fpm.

It is felt that 30 to 50 gal. of water will be used per lb. of fiber processed, although this figure may be substantially reduced. The water can be used repeatedly, after passage over a side-hill screen for pith removal. The principal cost of operation should be the power cost for pumping.

II. Pulping of Bagasse Fiber For High Purity Pulps

Three types of fiber were pulped. Fiber designated as A was obtained from the laboratory extraction of fresh cane, followed by wet screening on the 18 cut flat screen and dry screening on 14 mesh screen wire. Fiber B was obtained by soaking dry, baled bagasse in hot water, two passes through the rotapulper, wet and dry screening similar to A. Fiber C was made from dry bagasse, soaked and refined in the same manner as fiber B, but separated by two passes over the washing screen.

The various materials used were analyzed and their lignin and pentosan contents were as follows:

Table III—Effect of Acid Extraction on D.P. and Brightness of Pulp

	Pulp No. 1049			
	After Steeping		After ClO_2 Treatment*	
Steeping Time Min	D.P. No.	G.E. Brightness	D.P. No.	G.E. Brightness
0	1015	53.0	970	69.2
30	1010	55.4	995	76.3
60	1010	57.1	1000	77.0
90	1012	57.4	990	77.8

*ClO_2 treatment consisted of adding 50% of $NaClO_2$ (basis dry pulp) at 4.0% consistency. Mixture acidified to pH 4 with acetic acid. Mixture allowed to stand for 30 min. at 165°F before washing pulp.

(In all cases, pulp steeped in dilute HCl at a pH of 1.0. 20.0 cc concentrated HCl required per 100 gm O. D. pulp. Consistency of steeping—2.0% O. D. Temperature of steeping, 65°C).

Material tested	% Lignin	% Pentosan
Dry, baled bagasse	20.7	23.4
Dry, baled bagasse, after hot water extraction*	22.6	27.3
Depithed fiber from screw-press sugar extraction (A)		26.4
Fiber from baled bagasse, depithed by wet and dry screening (B)		25.8
Fiber from baled bagasse, depithed by screen washing (C)	24.0	24.8
Pith, separated from short fiber by flotation	21.9	30.5

*Hot water solubles constituted 13.8% of the dry, baled bagasse.

It appears that pith is somewhat higher than fiber in pentosan and a little lower in lignin content. However, there is not sufficient divergence in the analyses to permit the use of chemical analysis as an indication of per cent pith in fiber. The principal difference in the two materials lies in their physical states, the pith being a very thin walled, cellular material, while the fiber is a dense collection of short cellulose fibers cemented together by lignin.

Pulping bagasse fiber

All pulps were cooked at constant concentration of chemical, simulating continuous operation. The pulping equipment is completely described in an earlier publication (Harvin, Hills, Rothrock and Nolan, *Tappi* 33, No. 7: 338-343, July 1950). Concentration was maintained substantially constant by the use of a very high liquor-to-bagasse ratio. It is not intended that this high liquor ratio be used commercially. Constant concentrations can be maintained, using normal low liquor ratio, by continuous injection to replenish chemical as it is used.

All cooks were carried out at high concentrations, 80-125 gm. Na_2O per liter. It has been found, as a result of research in this laboratory on wood pulping, that pulps with the low pentosan content necessary for dissolving grades can be produced with kraft or soda liquors if the concentration is to be maintained at 80 gm. per liter. In general, the cooking liquors were made up from mixtures of 75 per cent NaOH and 25 per cent Na_2S, although one series of cooks was carried out with no use of sulfide. All of the pulping data for the high concentration cooks are listed in Table II.

The data show that bagasse fiber is ideally suited, by its natural degree of subdivision and consequently high surface area, for rapid continuous cooking. Pulps containing 95-96 per cent alpha-cellulose can be obtained in 5 min. cooking time at surprisingly low steam pressure, 80 psig. Pentosan content is satisfactorily low, comparing with spruce sulfite, a standard source of dissolving pulps. Cooking curves for the conditions studied are shown in Fig. 4. Pulping is so very rapid that the sections of the curves between 0 and 5 min. cooking time can only be estimated and are shown in this region as dotted lines.

Degree of polymerization of pulps

It would appear that, for dissolving purposes, the bagasse has been cooked too uniformly. That is, degradation of the pulp has been held at a minimum, as indicated by the degree of polymerization of the cellulose. Pulps cooked for 5 min. at 80 psig. and 80 gm. per liter had D.P. numbers in the range of 1700 to 2000, much too high for xanthation. Use of higher steam pressures, longer cooking time, or elimination of sulfide in the cooking liquor will reduce the D.P. of the pulp.

A very rough relationship between the D.P. of the pulp and cooking conditions is shown in Fig. 5. It is probable that pulps with a D.P. of 1000-1100, unbleached, would be most suitable for dissolving purposes. The conditions chosen as best suited for dissolving purposes were 80 gm. per liter, 25 per cent sulfidity, 125 psig. steam pressure, and 10 min. cooking time. Pulps No. 1049 and 1073 correspond to these conditions. A screened yield of 45 per cent of the depithed fiber can be expected under these conditions.

Bleaching of pulps

It has been found that these pulps cannot be bleached to a G.E. brightness of over 72, regardless of the quantity or type of bleaching agent used, unless the pulp is first extracted with dilute acid. It is not as yet known whether the coloring matter in the pulp is due to the bagasse itself, iron in the cooking liquor, or reaction between components in the bagasse with sulfides. It was found that the pulps cooked without sulfide (cooks No. 886-888) were somewhat brighter than those using sulfide, but these pulps were not bleached. Some iron

Table IV—Bleaching of Bagasse Pulp

	Pulp No. 1073	Pulp No. 1073 (acid washed)
Initial G.E. Brightness	53.0	61.4
Initial D.P.	1060	
1st Stage		
Estimated Cl_2 demand (% of pulp)	2.50	2.40
Chlorine applied (% of pulp)	1.54	1.30
Chlorine consumed (% of pulp)	0.935	0.825
Consistency (% O.D.)	3.50	3.75
Time (Min)	60	60
Temperature (°F)	85	85
2nd Stage		
Chlorine applied (% of pulp)	0.281	0.700
Chlorine consumed (% of pulp)	0.212	0.218
*CaO applied (104% of Cl_2 applied)	0.292	0.730
Consistency (% O.D.)	3.0	3.0
Time (Min)	60	60
Temperature at end (°F)	91	85
pH at end	10.85	11.00
3rd Stage		
Chlorine applied (% of pulp)	0.190	0.300
Chlorine consumed (% of pulp)	0.185	0.231
NaOH applied (% of pulp)	0.168	0.168
Consistency (% O.D.)	14.0	12.0
Time (Min)	120	120
Temperature at end (°F)	95	98
pH at end	9.03	9.08
G.E. Brightness	65.4	82.8
4th Stage		
NaOH applied (% of pulp)	2.0	2.0
Consistency (% O.D.)	13.0	12.0
Temperature at end (°F)	163	120
Time (Min)	60	60
5th Stage		
Chlorine applied (% of pulp)	0.190	0.100
Chlorine consumed (% of pulp)	0.168	0.084
NaOH applied (% of pulp)	0.168	0.800
Consistency (% O.D.)	14.0	12.0
Time (Min)	105	105
Temperature at end (°F)	95	95
pH at end	9.03	11.60
G.E. Brightness	66.5	84.0
SO_2 Wash		
Consistency (% O.D.)	3.0	3.0
Time (Min)	30	30
Temperature (°F)	85	85
pH	5.75	4.00
G.E. Brightness	68.1	84.0
Total Chlorine consumed (% of pulp)	1.50	1.36
D. P. of bleached pulp	880	
Ash content of pulp	0.14	0.14

*CaO added 3.0 minutes after Cl_2 and pulp mixed in second stage.

Table V—Pulping of Bagasse for Papermaking Grades

Cook No	Depithing Method	Steam Press. psig	Cooking Time Min.	Cooking Liquor: Conc gm Na_2O per L.	Cooking Liquor: Sulphidity %	Cooking Liquor: Percent Chem % of dry bagasse	Cooking Liquor: Liquor Ratio	Yield — % of Orig. Material: Total	Yield — % of Orig. Material: Screened	Lignin in Pulp %	Pentosan in Pulp %
821	none	80	10	35.0	25	18.5	5.4:1	48.4	43.0	----	----
822	none	80	15	35.0	25	18.5	5.4:1	48.7	45.8	2.6	26.3
823	none	80	20	35.0	25	18.5	5.4:1	47.6	46.0	2.0	28.0
850	B	80	12	19.9	25	17.8	9.2:1	62.8	62.5	1.7	23.4
851	B	80	15	19.9	25	17.8	9.2:1	60.8	60.7	1.8	23.8
863	B	80	15	19.9	25	18.5	9.0:1	60.4	60.2	2.1	24.0
864	B	80	15	19.9	25	16.7	8.6:1	63.0	62.7	----	----
865	B	80	15	19.9	25	15.4	8.0:1	63.6	63.1	----	----

was present in the cooking liquors, caused by iron salts in the city water supply used in making up the liquors. None of the pulp produced from green cane fiber (cooks 814-815) were available when the bleaching experiments were conducted. Therefore, it is not known whether the poor color was due to processing of the bagasse before baling.

It was found that a dilute HCl extraction removed the material interfering with bleaching. This acid extraction caused negligible degradation of the cellulose, as indicated by the D.P. of the pulp before and after extraction. Data on this acid extraction are listed in Table III.

Pulp No. 1073, identical with No. 1049, was bleached in five stages, including chlorination, hypochlorite and caustic extraction. The data for the bleaching of the pulp, with and without acid extraction, are presented in Table IV. The data show that the chlorine demand is extremely low, about 1.5 per cent equivalent chlorine, based on pulp.

The effect of acid extraction on final brightness of the bleached pulp is clearly shown by the data. The unextracted pulp attained a final G. E. brightness of only 68.1, even though considerable excess of chlorine had been employed. After extraction, the pulp was bleached to a G.E. brightness of 84.0—a very satisfactory figure.

Typical of all bagasse pulps, the ash content of this pulp was high. The original bagasse contained 0.49 per cent ash. The cooking process did practically nothing toward ash removal as the ash content of pulp No. 1073 was 0.98 per cent. The 60 min. extraction with dilute HCl reduced ash content to 0.20 per cent while the bleaching process accomplished a further reduction to 0.14 per cent. The proportion of this ash which is silica has not yet been determined. It is not known whether the high ash content of the bleached pulps will interfere with the spinning characteristics of these pulps.

The D.P. of the bleached pulp (880) is at about the correct value for proper xanthation. Its pentosan content (2.0%) is satisfactorily low for dissolving purposes. Although this pulp has not yet been tested for the production of rayon, its analysis indicates that it should be a satisfactory raw material in this field.

III. Pulping of Bagasse Fiber for High Strength Pulps

In this phase of the research, the same equipment was used as for the cooking of high purity pulps. Since high pentosan is desirable in papermaking grades, low initial concentration of cooking liquor was used and low liquor-bagasse ratios were employed to insure decreasing concentration during the cook. Constant steam pressure was used in all cooks.

The pulping data are reported in Table V. Some cooks were carried out in which liquor ratio was set at 3.5:1. The bagasse was so light and fibrous that good mixing between fiber and liquor could not be obtained, and yield data were unreliable. These cooks are not reported in the table.

It will be noted that yields of pulp from the depithed bagasse are very high, being in the range of 60-63 per cent. This increase over the yield of dissolving grades is primarily due to the conservation of pentosan in the pulp. Bagasse which did not have pith removed before cooking was pulped to a much lower yield. Loss in yield was caused by degradation of pith cellulose, which presents much greater surface for reaction than does the fiber cellulose.

Several of the spent liquors were analyzed for active alkali. It was found that chemical consumption was very similar to that found in the pulping of wood. The average chemical consumption amounted to 0.236 gm. Na_2O per gm. of bagasse dissolved.

Table VI—Physical Strengths of Bagasse Pulps

Cook No.	Beating Time Min.	C.S. Freeness cc	Breakage* Length Meters	Burst* Factor	Tear* Factor	Double Folds	Density gm per cc
850	0	604	9700	63.2	75.1	724	56.6
	7	476	11030	73.4	70.2	874	
	15	286	11680	77.1	68.2	1134	
	25	159	12171	79.0	60.5	1341	
	40	75	12080	77.2	55.8	1621	57.4
851	0	574	9240	64.7	74.3	712	57.5
	7	488	11840	70.9	61.8	828	
	20	290	11890	80.2	59.6	1080	
	30	183	12290	79.4	60.0	1348	
	40	106	11840	80.4	57.1	1565	58.5
864	0	603	9470	55.0	78.4	793	59.5
	7	534	10070	61.3	76.2	947	
	15	436	10920	67.6	65.0	1069	
	25	329	11560	70.4	63.6	1073	
	50	119	11510	75.8	48.3	1514	60.7
865	0	622	9310	56.4	85.0	768	57.0
	7	550	10570	62.8	77.3	850	
	15	453	11000	68.2	73.8	696	
	35	216	11450	75.3	62.6	997	
	50	112	11940	75.2	56.4	1322	58.7

*Units of physical strength expressed according to TAPPI Standard No. T-220.

Physical strength of pulps

Several of the pulps were hydrated in the Niagara beater, and hand sheets were prepared for physical testing. All methods followed the standards set up by TAPPI. Sheets were tested for double folds, tensile strength (breaking length), bursting strength and tear strength. Results are reported in units recommended by TAPPI Standard No. T-220.

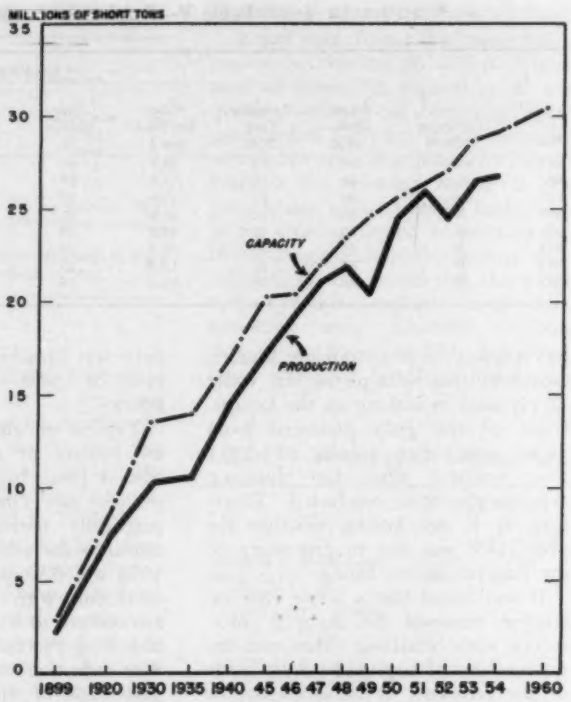
Physical strength data are reported in Table VI and are shown graphically in Fig. 6. For purposes of comparison, strength values for a high grade of unbleached pine kraft pulp are also plotted in Fig. 6. It can be seen that the bagasse pulps are definitely su-

(Continued on page 59)

Pulp and paper industry highlights for 1954*

— an economic review

W. LeROY NEUBRECH**
U. S. Department of Commerce



APPROXIMATELY ONE MILLION tons of new annual paper and board capacity was added to the industry's productive facilities in 1954, bringing total practical maximum United States capacity to about 30 million tons by the end of last year. For 1955, industry estimates indicate a further expansion in productive facilities of about 500,000 tons.

Trends toward integration and consolidation

The year 1954 also brought further integration of operations, either through building of new facilities or by purchase or merger with existing facilities. In a number of instances, consolidations of companies were largely for the purpose of increasing diversification of grades or products. There was some evidence of the mass-grade producing mills going into specialty grades, which have been produced for many years largely by the non-integrated mills. The continued economic existence of many of the 300-odd independent mills will depend in large measure upon modernization of plant facilities. A few spendid examples of progressive management in this direction were manifest in 1954.

One of the primary general objectives of the consolidations in operations was efficiency in operations to counter-balance growing costs in capital investment, labor, and transportation and to reduce handling costs. Mechanization has become the keyword for forestry practices, logging, utilization of waste wood through the development of mechanical and hydraulic barking devices, new methods of handling wood in pulp mill storage yards, and many other innovations. Streamlining of pulp, paper and board mill operations, speeding up machines, the use of new and wider machines, and many other improved manufacturing techniques, including finishing room operations, were evident in 1954, and will continue in the years ahead.

More paper for general commodity distribution

The field of general commodity distribution, especially at retail levels, appears to be the "stage setting" for the next era of major change. The national growth in the super self-service grocery and drug store during the past decade would suggest a similar pattern in many other types of retail merchandise. The individual sanitary packaging of foods and drugs, largely in paper or paperboard, made

1954 — Pulp and Paper Statistics

1954 added capacity	1,000,000 tons
1955 estimated added capacity	500,000 tons
Total 1954 capacity	30,000,000 tons
Employment: 436,000 employees received	$1,680,000,000 in wages

	PRODUCTION	IMPORTS	EXPORTS	CONSUMPTION
Pulpwood		1,600,000 cords		29,200,000 cords
Wood pulp	18,300,000 tons	2,050,000 tons	442,000 tons	19,800,000 tons
Paper & Board	26,700,000 tons	5,200,000 tons	590,000 tons	31,200,000 tons
Newsprint	1,192,000 tons	4,992,000 tons	140,000 tons	6,082,000 tons
Value	$2,681,000,000	$925,000,000	$228,000,000	

*Condensed from the Department of Commerce's annual review edition of *Pulp, Paper and Board*.

**Mr. Neubrech is deputy assistant director for pulp, paper and paperboard in the Forest Products Div.

possible the serve-yourself type of operation in groceries, drugs, and allied lines. What will a few more years mean in thousands of other items, such as men's ties, shirts, or socks; women's hose, underwear, handbags, etc.; household necessities, hardware, etc.? Should self-service retailing spread to the various items on a national basis, the per capita consumption of paper and board should rise proportionately.

From a marketing point of view, more companies have been enlarging their operations to cover wider areas of sales distribution—not only on the national market but also in selected foreign countries. Perhaps 1954 will go down in history as the first year that the paper industry showed major interest in foreign markets—not only in selling abroad but also in establishing branches overseas.

Production and consumption of paper and board

U. S. production of paper and board in 1954 totaled 26.7 million tons. Supplementing U. S. 1954 production were imports of 5.2 million tons, resulting in a new supply of 31.8 million tons available for distribution. Subtracting U. S. exports in 1954 — or 590 thousand tons — left a balance of 31.2 million tons, which apparently went into actual consumption during the year. Inventory levels of paper and board at mills, converters, and wholesale merchants remained relatively steady throughout 1954. Total United States apparent consumption of paper and board in 1954 was slightly under that of the previous year. In 1953 apparent consumption was 31.4 million tons, as against approximately 30.0 million tons in both 1952 and 1951.

Production and consumption of newsprint

United States production of newsprint paper in 1954, totaling 1,192,000 tons, was the largest domestic output since 1931. Domestic output of newsprint paper has been rising steadily since 1946, following the low point in 1944, when only 721,000 tons were produced.

United States apparent consumption of newsprint in 1954, totaling 6,082,000 tons, was only slightly less than the indicated record consumption of 6,090,000 tons in 1953. Imports of newsprint, largely from Canada, totaled 4,992,000, recording a slight decline from 1953. United States exports of newsprint in 1954 amounted to 140,000 tons, being nearly three times greater than in 1953. Inventories of newsprint paper in the hands of publishers and domestic mills showed only a moderate downward trend from January 1 through December 31, 1954, amounting to a decline in stocks of 38,000 tons.

Production and consumption of wood pulp

Wood pulp production in the United States in 1954 was 18.3 million tons. Supplementing U. S. production of wood pulp in 1954 were imports of 2.05 million tons, bringing total new supply last year to approximately 20.4 million tons. From the standpoint of distribution, exports accounted for 442,000 tons; U. S. consumption in paper and board manufacture absorbed 19,034,000 tons; non-paper users accounted for 762,000 tons; and the balance went into inventories.

U. S. consumption of total wood pulp in 1954 in paper and board, plus non-paper uses, amounted to 19.8 million tons.

The upward trend in wood pulp consumption as a major raw material in paper and board production, influenced to an important degree by the upsurge in new advances in hardwood pulping, including semichemical and chemi-groundwood, is indirectly disclosed by the lowered level of waste paper consumption in 1954. Last year total waste paper consumption was 8,064,000 tons, as compared with 8,531,000 tons in 1953.

Value of output

From the standpoint of the dollar value of manufacturers' sales of pulp, paper, board and products, the industry also set a new high record in 1954. Last year sales totaled $8,738 million, compared with $8,704 million in 1953, $7,979 million in 1952, and $8,477 million in 1951.

Comparing 1954 value of sales data as related to volume of production against corresponding data for 1953, it is indicated that the price levels of the industry remained generally steady during the past year. This is borne out by the price indexes compiled by the Bureau of Labor Statistics, which show only minor or no changes between the 1954 and 1953 price levels of wood pulp, the major grades of paper and paperboard and converted products. Waste paper prices (except for books and magazines) showed moderate declines in 1954 from their 1953 levels. The average price index of all commodities (except foods) averaged 114.5 in 1954 (1947-49 equalled 100) as against 114.0 in 1953. Pulp, paper and products as a group stood at 116.3 for 1954 as against 116.1 in 1953.

Pulping of Bagasse

(Continued from page 57)

perior to pine kraft in burst, tensile and double folds. In tensile strength the bagasse is about 20 per cent stronger than the maximum strength of the kraft pulp. In burst it is 10 per cent stronger. Double-fold data are too unreliable for quantitative comparison, but it can be seen in Fig. 6 that bagasse is definitely superior.

Bagasse is deficient in tearing strength, being less than half that of pine kraft. This is to be expected, as the fiber length of bagasse is in the order of 1.0 mm, compared to 2.5-3.0 mm for pine.

The most interesting feature of the strength of bagasse pulp in burst, tensile and folding strength lies, not in the very high values for maximum strength after beating, but in the very high strength of the pulps before beating. Most wood pulps, before beating, are low in burst and tensile strength, and their folding endurance is negligible. On the other hand, bagasse pulps are very strong before beating and reach their maximum strength after very little time in the beater.

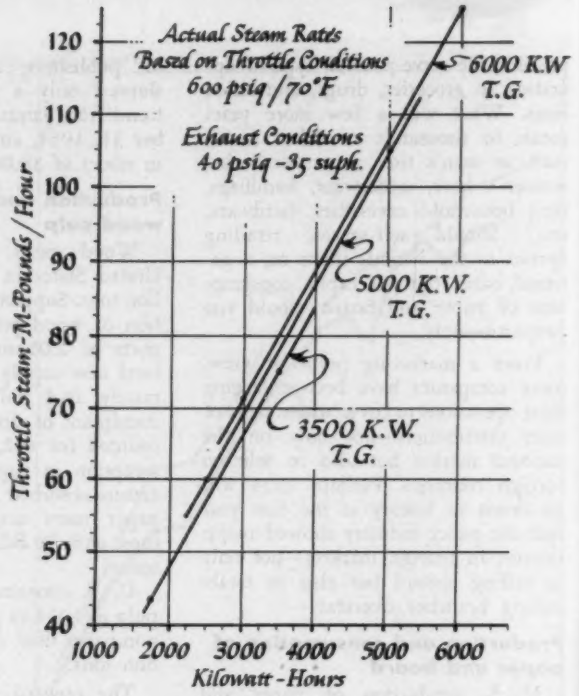
These high unbeaten strengths are probably due mainly to the very high pentosan content of the pulps. Pentosan content of 23-24 per cent can easily be realized in bagasse pulps, in contrast to about 18 per cent in hardwood pulps. Pine kraft usually contains 8-9 per cent pentosan. The commercial significance of this high pentosan content lies in the very low power costs which will be involved in refining bagasse pulps ahead of the paper machine.

The research program, to date, on the production of papermaking grades is admittedly brief. It seems quite possible that more detailed study may result in pulps of somewhat higher strength, particularly in tearing strength. No work has yet been done on the bleaching of papermaking grades, but the low lignin content of the pulps (about 2.0%) indicates that the chlorine demand will be low. Acid extraction may be necessary before bleaching.

It is apparent that bagasse will produce pulps of higher quality, strength-wise, than can be expected from the hardwoods. It can also be used where ever kraft is used, if tear strength is not important. It is not recommended for use in newsprint, except as a very good substitute for the sulfite component. The pulp is inclined to the translucency that is common to all cooked pulps and, in none of its properties, does it resemble groundwood.

Paper mill power supply

MICHAEL POPE
Consulting Engineer



When to buy power from a central utility station and when to make your own are important questions that confront every pulp and paper mill

ONE OF THE most vital problems continually facing pulp and paper mills is the question of how much power to generate and how much to purchase.

Owing to progress in the field, public utility plants have improved efficiency to such an extent that a kilowatt-hour is often produced on less than one pound of coal. Industrial management is, therefore, often more inclined to invest expansion capital in production equipment where it might be returned two or three times more rapidly than money invested in power plant equipment.

On the other hand, where the power can be made as a by-product from process steam requirements, its cost is only a fraction of the lowest rates available from the central station.

In still other cases, minimum operating costs can be secured by combining purchased and generated power. Use of two sources enables the purchaser to generate a portion of cheap power from his process steam requirements with a comparatively small plant, while the utility company supplies the balance of the energy.

When to buy power

The most economical solution for any particular plant is obtainable only through an independent study of each set of conditions. The special knowledge and wide experience necessary to a correct solution is not usually available in any but the largest plants. And, in many of these, it is impossible for the resident engineer to give his undivided attention to a single problem. The difference between the right solution and the many wrong ones may often mean a difference of from $10 to $15 per ton of finished paper.

Although varying conditions preclude any standardized answer, some general principles can be followed in order to approach this question correctly.

Where dependable purchased power is available at reasonable rates, it can generally be economically used. The more efficient utility stations, making use of regenerative and reheat cycles, have attained heat rates as low as 9200 BTU per KWH. As a result of these technological advances, the amount of power generated by industrial firms has decreased steadily through the years to a point where it represents about 15 per cent of the total power generated in this country.

Particularly in the case of the small paper mill, the cost of labor necessary for power equipment prohibits plant generation. A turbine paper machine drive exhausting into the dryers may yield an efficient heat balance when combined with purchased power.

It also pays to buy power when the business outlook is unstable, or where the demand for a particular paper product increases so rapidly that management is hesitant about risking capital in a plant which would be unsuitable in a few years.

Finally, it may be economical to purchase some power where the exhaust steam from existing plant power equipment is utilized for heating and process demands, but the power so generated does not meet all requirements. In this case, parallel operation may prove to be most advantageous.

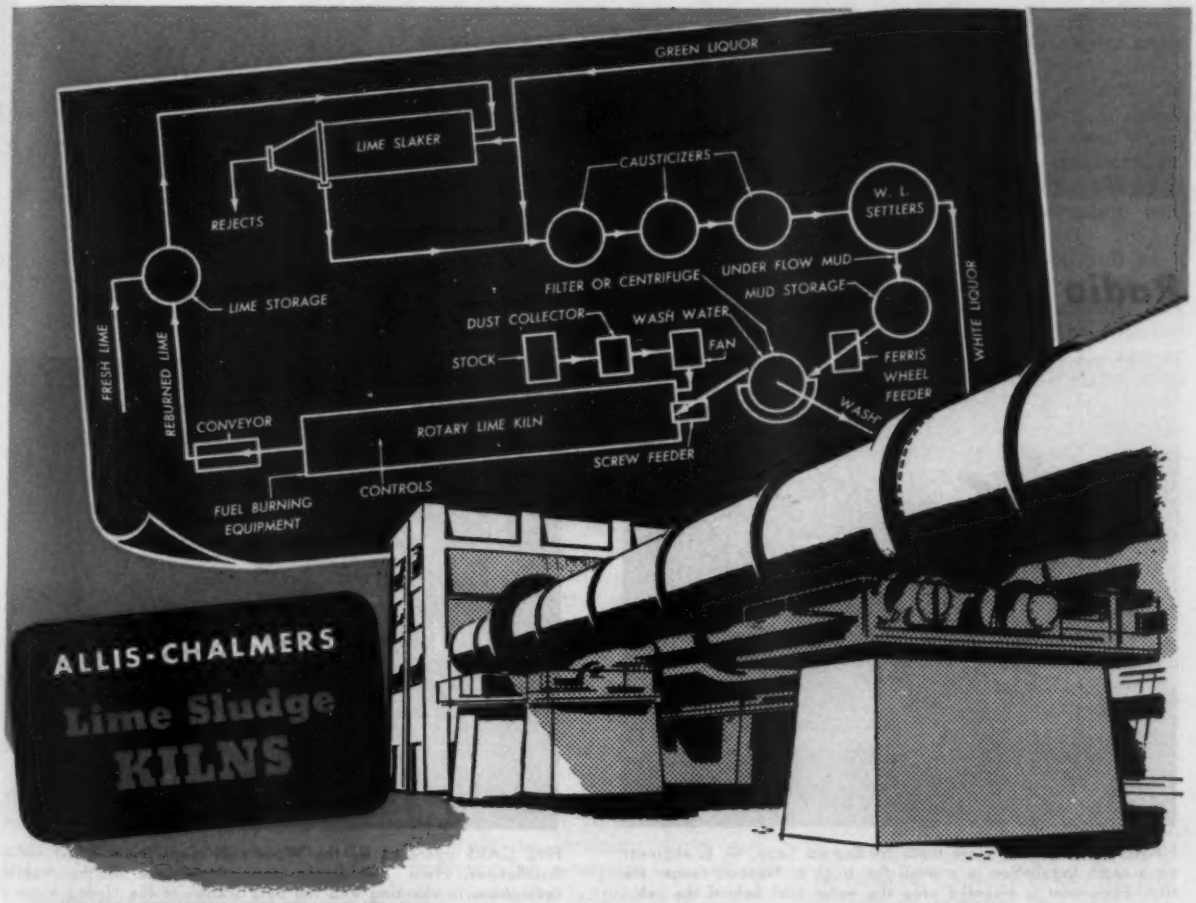
Process and heating requirements—determining factor

The most important single determining factor in the correct solution to the paper mill power problem is the process and heating steam requirement. This follows from the fact that the major portion of the heat in the steam entering a prime mover still remains in the steam discharged to the exhaust. This is true whether the steam enters a condenser, is utilized in the heating system, or is wasted to the atmosphere.

For example, take the case of a 5000-KW turbine unit with throttle steam conditions of 600 psig and 710°F, exhausting at a 40 psig back pressure. At full load, it will pass about 20.9 lbs. of steam per kilowatt-hour.

The heat in a pound of the inlet steam is 1356 BTU, and in a pound of exhaust steam 1195 BTU, or 88.1 per cent of the heat in the throttle steam. Therefore, only 11.9 per cent of the total initial heat has been expended to generate power.

(Continued on page 90)



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THERE are forty-five Allis-Chalmers lime sludge kilns increasing profits in American and Canadian pulp mills. This pronounced preference reflects industry-wide recognition of the superiority of A-C kilns. But that's only part of the story. An equally important preference establishing factor is the creative engineering help available from Allis-Chalmers . . . the invaluable application of broad experience and technical skill that assures maximum utilization of equipment and personnel.

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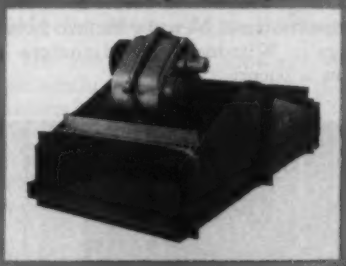
Another A-C Product for the Paper Industry



High Capacity *Low-Head* Pulp Screen

Horizontally operated Low-Head vibrating screen is a compact, space-saving screen designed for high capacity and low maintenance. Available with parts of high tensile steel, plastic coated high tensile steel, and stainless steel. For complete facts, send for Pulp Screen Bulletin 07B6592.

Low-Head is an Allis-Chalmers trademark.

ALLIS-CHALMERS

NEWS of the INDUSTRY

Radio NEPCO—a new aid to forest fire vigilance

FINAL ADJUSTMENTS are made by Donald Yapp, G. E. engineer, on a radio installation in a small fire truck at Nepco's ranger station. Equipment is mounted atop the water tank behind the cab

FIVE CARS operated by the Woodlands Department boast radio installations. Here, Bob Dosen demonstrates use of the mobile radiophone in checking with the base station at the Nepco nursery

THE INSTALLATION of a two-way radio system is the latest step in Nekoosa-Edwards Paper Co.'s battle in the prevention of forest fires. Fire protection on Nepco's timber holdings in Wisconsin and Minnesota is now a science.

AN INCOMING call is logged at the base station by Maxine Gust, nursery secretary. A special fire control room has been set up to synchronize efforts of fire fighting personnel

While the primary purpose of the network is fire protection, it has also proved itself a time-saver in communicating between nurseries, offices and men in the field.

The system operates on 49.22 megacycles and has base units in central Wisconsin at the Nepco No. 5 nursery in Port Edwards and at the Nepco ranger station in Adams county. The northern Wisconsin base units are at Minocqua and at a base camp of the Pine Lake forestry operations in Oneida county. The latter is in the center of 60,000 acres of forest land.

The radio network ties in on the same frequency as that of Tomahawk Timber Co., a partially owned subsidiary at Ely, Minn.

Radio NEPCO, which was installed by General Electric Co. engineers, had been in operation only three hours when it underwent its first test. When a small fire was reported on company property in Wood county, the network proved itself. Within minutes men and vehicles were at the scene, and from the fire area itself an extra stand-by crew was ordered to assemble.

Routine company business is by no means outside the network's scope of operations. A needed piece of equipment can be ordered from headquarters by a woods crew; a planting crew can order extra trees. Nekoosa-Edwards has found that

WITHOUT THE NEW radio system at Tomahawk Timber Co. there would be no link between the main camp and the Ely headquarters. The operator of the G. E. equipment is Kendall Armagast

PEERING DOWN from atop the 90-ft. radio tower at Nekoosa-Edwards' No. 5 nursery is "aerialist" Bob Stein. All the tower installation work was done by Mr. Stein of Port Edwards

this communications link will save many valuable hours in normal business operations, while serving its first purpose: protecting woodlands from the threat of fire.

A National Hook-Up

Nekoosa-Edwards is a member of the Forest Industries Radio Communications system that covers the nation for the wood products industry. The FCC has allocated certain frequencies for industrial use. The forest radio group in turn must allocate these frequencies to its more than 300 members.

The nationwide network is in active participation with the Air Force Ground Observer Corps, aircraft wreckage spotting information, and a general alerting plan set up for industry. In the event of national emergency, Radio NEPCO is ready for action.

Major St. Regis Project Nears Completion

A major construction project involving an expenditure of more than $2,300,000 is nearing completion at the St. Regis Paper Co. Kraft Center in Pensacola, Fla.

Included in the pulp and paper mill expansion program is the construction of a new boiler and turbine in the power plant, erection of one of the largest high density storage systems in the country, and the installation of a new washer system in No. 1 pulp mill. Completion is expected the latter part of April.

The new boiler has an hourly steam capacity of 140,000 lbs., while the turbine generator has a capacity of 6000 kw.

The high density storage system, which has been installed as part of No. 2 pulp mill, is composed of three tile tanks 36 ft. in diameter and 60 ft. high. The tanks are capable of storing 500 tons of pulp between pulp mill and paper mill, thus permitting the former to operate independently of the paper mill and maintain a constant rate of production.

The washers will replace diffusers installed in 1940 as part of the original mill. The system comprises three washers, each 8 by 12 ft., and will increase the washer capacity from 225 to 375 tons daily.

Dierks Delays Building

Dierks Forests Inc. has announced that it has postponed indefinitely its plans for a multi-million dollar newsprint mill in the South. According to the firm, the postponement is due to "difficulty in obtaining direct commitments for newsprint, as well as other important factors."

The possibility that Dierks would build a newsprint mill was revealed last year at the convention of the Southern Newspaper Publishers Association in Boca Raton, Fla. It was to be built in either Arkansas or southeastern Oklahoma.

International Chooses Mobile as Site of New Southern Newsprint Mill

Mobile, Ala., has been selected as the site of the $20,000,000 newsprint mill recently announced by International Paper Co. The decision on the plant location was reported by Erling Riis, International vice president and general manager of the Southern Kraft Div.

Many factors dictated the decision: the availability of large timber resources within easy trucking and rail radius, the presence of an adequate supply of suitable water, the availability of highly skilled labor, good transportation facilities, and the proximity of International's present Mobile mill.

The new plant will have an annual newsprint capacity of 100,000 tons. It will require a daily 365 cords of pulpwood and use approximately 6,000,000 gal. of pure water every 24 hours.

Making possible the production of top quality newsprint at high speeds will be a 282-in. Beloit Iron Works machine incorporating the latest innovations. The IPCo engineering and operating staff is collaborating with Beloit in the project.

The major construction will be a 1400-ft. building to house the new paper machine and finishing and shipping departments. The structure will be located adjacent to the present mill. Plans also call for additions to the existing chemical pulp mill and bleach plant, installation of a complete groundwood pulp mill, and expansion of the present wood storage and handling facilities.

Great Lakes to Increase Efficiency, Quality in $1,600,000 Program

Great Lakes Paper Co. Ltd. plans the expenditure of an initial $1,600,000 in a program aimed primarily at increasing efficiency at Fort William, Ont.

According to C. J. Warwick Fox, president, production will be increased slightly and quality will be improved, while costs are expected to be reduced. Capacity newsprint production is expected this year, and the output of sulfite pulp will be as close to capacity as possible.

Two Southern Mills Plan Grinder Motor Installations

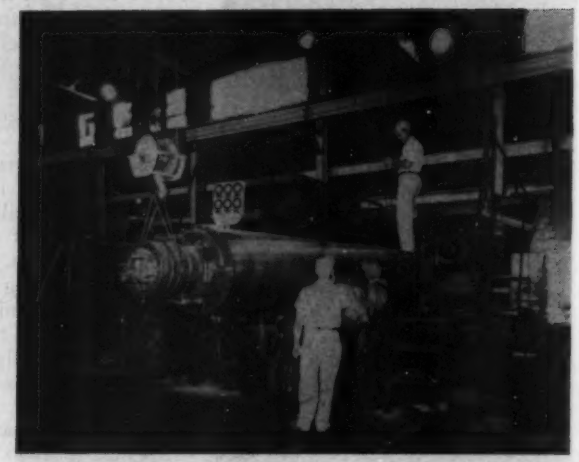
The first of several 6000-hp, 240-rpm synchronous motors to drive pulp grinders will be built this year for Bowaters Southern Paper Corp. at Calhoun, Tenn. The unit is said to be the largest ever produced to drive a single pulp grinder.

To be designed and built by Electric Machinery Mfg. Co., the motor will be totally enclosed, with an air-to-water cooler located under the base. Sleeve bearings will be oil ring lubricated.

A second similar installation will be at Southland Paper Mills Inc. of Lufkin, Texas. As part of a large expansion program, the firm has completed arrangements to buy five 5000-hp, 240-rpm, 6900-volt synchronous motors that will drive magazine grinders.

Also products of Electric Machinery, the units will be of the pedestal type and semi-enclosed, with top air discharge through a duct. They will have full-voltage starting controls.

Union Bag Installs Largest Monel Suction Roll



THE WORLD'S LARGEST wrought Monel suction roll has been installed at the Savannah, Ga., plant of Union Bag & Paper Corp. More than 23,500 pounds of Monel plate and 700 pounds of Monel welding rod were used in its construction. The suction press roll is 240 in. long, 36 in. in diameter and 2 in. thick

According to International Nickel Co. Inc., this is the fifth roll of its type to go into operation; four smaller ones are in operation at the Chester, Pa., plant of Scott Paper Co.

The final inspection is given the roll (above, left) prior to installation. Fabricators on the project included Beloit Iron Works, Sandusky Foundry & Machine Co. and Youngstown Welding & Engineering Co.

Installation underway (above, right) at the Union Bag plant. According to the firm, Monel was selected "because it not only resists corrosion but also prevents surface buildup of fibers and chemicals"

Welding (right) consumed approximately 500 hours. The roll was made of three plates each formed into a 120° section and welded longitudinally

Alberta Mill Construction Scheduled for Late Spring; Daily Capacity Increased

North Western Pulp & Power Co. has announced that construction will begin in late spring on its projected bleached sulfate pulp mill in Canada's Alberta Province. Originally designed for a 300-ton daily capacity, the plant will boast a 24-hour output of 400 tons. The announcement of the change was made at a meeting of the board of directors.

North Western, which is owned jointly by St. Regis Paper Co. and North Canadian Oils Ltd., had originally planned to locate the mill at Edson. However, because of the better operating conditions (including effluent disposal) found at Hinton, it was decided to fix the mill site at the latter town. Hinton is about 200 miles west of Edmonton.

Using lodgepole pine and white spruce, the pulp plant will have a perpetual pulpwood supply through a long-term timber grant of about 3000 sq. mi. from the provincial government. In addition, because of the plan for increased capacity, the government has also set aside an additional 3000 sq. mi. as a reserve.

St. Regis will direct the design and construction of the mill and manage its operation. That firm will purchase a portion of the output for use in its own plants, while the balance will be sold on the open market. Consulting engineers for the project is H. A. Simons Ltd. of Vancouver, B. C.

Union Bag to Construct 15,000-Ton Tall Oil Plant

Union Bag & Paper Corp. has announced that it will build at its Savannah, Ga. plant a tall oil distillation unit with an annual capacity of 15,000 tons of crude oil.

The plant is being designed and constructed by Foster Wheeler Corp. of New York, N. Y., and will be located adjacent to Union Bag's present manufacturing facilities.

The operation will separate crude tall oil into resin and fatty acids and when completed will establish the Savannah plant as the only operation in the country producing crude and refined tall oil, distilled tall oil, and tall oil resin and fatty acids.

According to G. W. E. Nicholson, executive vice president in charge of manufacture, the term "tall oil" is of Swedish origin and means "oil of the pine tree." He explained that this by-product of kraft pulping is widely used in the formulation of paint and varnish materials, insecticides, cleaners, linoleums, and soaps.

Forest Service Establishes Genetics Institute

A new forest genetics institute in the South has been established by the United States Forest Service at Gulfport, Miss. A primary purpose of the unit will be basic research in tree breeding with emphasis on fast growth, high pulp yield, or resistance to insects or diseases.

The Southern Institute of Forest Genetics is a branch of the Southern Forest Experiment Station at New

Imperial

a triumph in winder engineering!

ADAPTABILITY: The Imperial handles all weights and types of paper and board. A unique suspension, and adjustable automatic counterbalancing, provide optimum torque and pressure distribution for all grades. The machine can be equipped with either score-cut or shear-cut slitters, or a combination of both, to provide the best slitting method for each of your materials. The Imperial is available in 42″ and 72″ rewind capacities for jumbo roll winding. It can also be equipped with semi-automatic attachments for high speed production of small diameter counter rolls.

SPEED: The Imperial runs at extraordinary rates both when accelerating and at constant speed . . . meets all production needs. Conservative, field-proven engineering, and precise dynamic balancing of all rotating elements, positively assure smooth operation from start to maximum speed. All rolls and main drive elements use heavy duty, oil lubricated, precision anti-friction bearings. The heavy, extra rigid framing dampens vibration. Shock absorbing, rewind "hugging" suspension of the riding roll, and friction inhibiting rewind shaft retention, contribute to superior web and strip control. The super-precision heavy duty slitting elements assure accurate clean-cut edges at all speeds, and the heavy duty driving elements meet all power requirements.

DURABILITY: The Imperial is designed and built for many years of trouble-free service. It has extra heavy construction throughout, with hardened and ground vertical ways for both the riding roll and rewind shaft carriages. The bearings and gears have a life expectancy in excess of 100,000 hours. The gear drive is designed to eliminate dynamic loading and is equipped with a water-cooled, forced-feed lubricating system. Centrifugal lubricant and dust seals are used on all high speed elements . . . and the superior shock absorbing rewind shaft handling equipment assures longer, lower-cost operation.

CAMERON MACHINE COMPANY 61 Poplar Street Brooklyn 1, N. Y.

the new Camachine®

heavy duty mill type slitter and winder

Job-proven for dependability, economy and roll quality at speeds never before achieved!

FEATURING extraordinary ease and speed of handling through:

QUICK SET, PRECISION SLITTERS

HYDRAULIC RIDING ROLL AND REWIND BEARING LIFTS

HYDRAULIC ROLL EJECTOR AND REWIND SHAFT INJECTOR

SIMPLE CENTRALIZED CONTROLS

DIRECT, EASY THREADING

The performance of the new Imperial speaks for itself in the mills it serves. Write on your company stationery for the complete story about the Camachine Imperial. Let us show you why it is the most productive, adaptable and durable mill type slitter and winder you can own.

saleable
for more tons per day

Larry Woodside, right, Albany Felt's chief service engineer, discusses felt applications with operating personnel at the Ft. Edward, N. Y., plant of Marinette Paper Company. Marinette is a subsidiary of Scott Paper Company, which is particularly well known for the high quality standards set for its tissue. The machine shown operates at speeds of over 2500 ft. per minute, with correspondingly severe demands on felt performance.

call in your Albany Felt service engineer

When you're faced with a particularly tough operational problem relating to felts —drainage, finish, felt life, or higher speed requirements—call in your Albany Felt service engineer! Albany's crack team of service engineers is known as the finest in the industry—due to many years of technical training and experience in the field. This wealth of practical "know how" is backed by outstanding designers, chemical and mechanical laboratories, and an extensive research and development program.

And, of course, your Albany Felt sales engineer is on call to bring you the greatest service from this combination of experienced technicians and modern facilities.

Albany Felt enjoys the "tough" problems because it gives an opportunity to show the difference between arriving at a solution scientifically as compared to "guesswork." Most of all, it permits us to show how proper applications of Albany felts help maintain top production and sheet quality. The result: "More SALEABLE Tons Per Day!"

FREE! Felt Performance Record Book for Mill Superintendents, Managers, Purchasing Agents. Write for your handsome leather binder containing convenient forms for maintaining records and graphs of felt performance, felt inventory, etc.

50 YEARS OF PROGRESS · 1895 · 1945 · ALBANY FELT COMPANY

ALBANY FELT COMPANY

"World's largest Manufacturer of Paper Machine Felts"

MAIN OFFICE AND PLANT, ALBANY 1, NEW YORK

Other plants: Hoosick Falls, N. Y.; North Monmouth, Maine; Cowansville, Quebec.

Orleans. In charge is Dr. Berch W. Henry. He is assisted by Dr. E. B. Snyder, geneticist; Dr. F. F. Jewell, pathologist, and Dr. L. F. Smith and R. M. Allen, silviculturists.

Construction for New R-W Plant in Progress

Construction work has started in Longview, Wash., for the greaseproof and glassine paper plant being built by R-W Paper Co. R-W is a company newly formed by Weyerhaeuser Timber Co. and Rhinelander Paper Co.

Handling the work on the project is Hoffman Construction Co. Structures will include a 120- by 360-ft. machine room, a 120- by 180-ft. beater room, and a 160- by 240-ft. finishing room and warehouse.

Hoffman will also handle the piping, electrical systems and installation of machinery, which is being built by Beloit Iron Works. Construction will take 12 to 14 months.

The construction firm is also at work installing additional facilities at the Weyerhaeuser pulp mill, which will supply R-W with raw material. Such facilities include new chip storage tanks, digesters, screening and bleaching units, boiler house and filter plant.

New FPRS Headquarters

The Forest Products Research Society will start construction of its new executive offices at Madison, Wis., in June. The announcement was made by Lester J. Carr, national FPRS president. Mr. Carr is president of L. J. Carr & Co. in Sacramento, Cal.

According to Mr. Carr, "the building will combine many of the newest and latest forest products materials and techniques in existence today."

Mando Modernizes No. 3 at International Falls

Minnesota & Ontario Paper Co.'s production of bleached and unbleached groundwood paper products will be increased following the modernization of No. 3 paper machine at International Falls, Minn.

Besides production increases, the modernization will also improve the quality of the papers made on the machine.

Presently underway, the project is expected to cost well over $300,000. Concentrated on the wet end, the modernization involves the installation of four new 3A Bird screens, new Bauer stock cleaning equipment, new Valley headbox and slice, a new mixing pump, plus related equipment. (The screens will be installed on a platform behind the present screens while the machine is in operation.)

Gair Plans Acquisition of Two Southern Firms

Large-scale expansion in the South has been proposed by Robert Gair Co. Inc. of New York, N. Y. According to George E. Dyke, president, Gair directors have approved agreements under which the company will acquire the assets and assume the liabilities of Southern Advance Bag & Paper Co. Inc. and Great Southern Box Co. Inc.

The agreements provide for an exchange of Gair stock for shares of the two other firms. Stockholders of the three companies must approve the proposals.

Robert L. Fitts
Pres. Southern Advance

Shelley Schuster
Pres. Great Southern Box

According to Gair, the expansion will extend its fabricating activities into the kraft bag field, in which it is not presently engaged; extend its container operations to a rapidly growing section of the Deep South, and substantially increase its timberland holdings and production of wood pulp and kraft.

"By bringing Southern Advance and its subsidiaries into Gair," Mr. Dyke explained, "we will not only diversify our activities by acquiring a well established bag and paper business at Hodge, La., but also increase our yearly kraft production by more than 100,000 tons and our timber acreage by nearly 70 per cent. . . .

"The acquisition of Great Southern and its subsidiaries fits into this program by extending our manufacturing operations into the Deep South and providing an outlet for a portion of our increased production of kraft linerboard at our Southern Paperboard mill."

Southern Advance, with executive offices in Boston, operates at Hodge a pulp mill, kraft paper mill, and bag plant with a daily capacity of about 350 tons.

Great Southern's principal product is corrugated shipping containers, which it manufactures at plants in Jackson, Miss., and New Orleans. Headquarters office is located in New Orleans. The firm also operates a plant at Magnolia, Miss., for the fabrication of wirebound wooden boxes and another at Jackson for the production of cleated shipping containers.

Chemical Industry Seen as Both Growth Possibility and Stiff Competition

The chemical field offers the pulp and paper industry one of its most promising areas of expansion, according to David L. Luke Jr., president of West Virginia Pulp & Paper Co. He warned, however, that at the same time chemicals provide the stiffest competition in end-product markets.

Speaking recently at a meeting of the New York Society of Security Analysts, Mr. Luke declared that West Virginia expects continuing growth of its chemical business to be "increasingly reflected in sales and earnings."

While the chemical field is a likely growth outlet for refined by-products of the pulp and paper industry, he continued, paper and paperboard is finding its greatest competition from the chemical industry. He cited films, foils and plastics.

"These have already made inroads in some of our markets," Mr. Luke stated, "and—despite their high costs—they have demonstrated their attractiveness to some classes of buyers."

Only Chemicals Bothersome

The speaker declared that the paper industry has no reason to fear competition from textiles, wood, glass or steel, for it has demonstrated competitive advantages against them. Only the chemicals bother him, he said.

In 1954, West Virginia produced 290,000 tons of white printing and fine papers, an equal quantity of container board, 125,000 tons of white converting papers and board,

and 85,000 tons of kraft paper. He revealed that sales of chemical products ran to some 56,000 tons.

Chemical operations began as an effort to clear stream pollution by the removal of lime sludge. Eventually, West Virginia developed a method whereby the recovered lime provided calcium pigments.

One of the pigments arising out of recent work has been patented, and more applications should soon be filed, Mr. Luke concluded. The firm also has a sizeable business in activated charcoal, tall oil and lignins.

MacMillan & Bloedel: 8-Year-Old Giant

One of Canada's youngest entrants into the pulp and paper manufacturing field is putting in an early bid for giant status. MacMillan & Bloedel Ltd. of Vancouver Island, B. C., has set its sights high.

The West Coast lumber and plywood colossus, which now operates kraft pulp mills at Harmac and Port Alberni, has recently announced that it will add the production of newsprint, kraft paper and container board. The expansion program will cost more than $30,000,000.

On completion of the project, MacMillan & Bloedel will be able to produce unbleached, semi-bleached and bleached kraft pulp at a 1000-ton-per-day clip. There will be groundwood pulp capacity to supply the newsprint operation; a daily 300 tons of newsprint, and 100 tons of kraft paper, liner board and corrugated container stock.

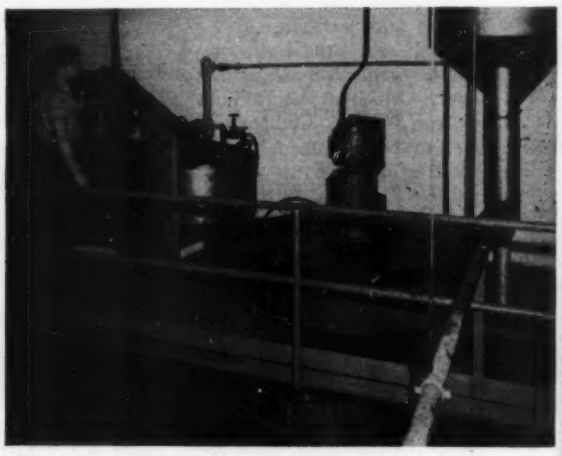
Completion of the new capacity is scheduled for early 1957. At that time, the firm will be producing between 375,000 and 400,000 tons per year (about 1250 per day) of pulp and paper products for the market.

In a recent issue, the *Financial Post* of Toronto pointed out that in just 10 years the West Coast firm and its predecessors (H. R. MacMillan Export Co. and Bloedel, Stewart & Welch merged in 1951) will have built from scratch an enterprise bigger than such well known eastern firms as Fraser Companies Ltd. (830 tons per day) and Brown Co. (1100 tons prior to the sale of Brown Corp.).

It will be within shooting distance of Powell River Co. Ltd. (1400 tons), Price Bros. & Co. Ltd. (1600), and Howard Smith Paper Mills Ltd. (an estimated 1300).

Still considerably in the lead production-wise will be such firms as Abitibi Power & Paper Co. Ltd. (3000 tons).

NEW PILOT fourdrinier machine at Knowlton Bros. Inc. at Watertown, N. Y. Wet end is at the far left, dryers in the foreground



WATER INLET valve at the Jones-Bertrams beater is adjusted by Arthur Jones, machine operator. All water is accurately metered

Knowlton Bros. Duplicates Production Conditions on Unique Machine Model

ACTUAL PRODUCTION conditions can be duplicated on a unique 42-ft. fourdrinier machine recently put into operation at Knowlton Bros. Inc. of Watertown, N. Y. The firm manufactures special industrial and technical grade papers.

According to David C. Knowlton, president, the machine will be used primarily for the company's own research and development program. However, it will also be leased to other firms for experimental purposes.

Experimental runs with from 50 to 100 lbs. of fiber are possible with the miniature machine. Large machine conditions are duplicated.

Stock is prepared in a small-scale Jones-Bertrams stainless steel beater having a tub capacity of approximately 28 lbs. at 5½ per cent consistency. The beater roll is 18 in. in diameter, with a 13-in. face, and weighs about 750 lbs. The bed plate covers 75° of the roll circumference —just as on the standard E. D. Jones & Sons Co. unit.

Contact pressures used in regular production beaters can be duplicated in this machine. A Taylor Instrument Companies gauge indicates pressure.

Glass Headbox

From the beater the stock flows into a cylindrical tile stock chest with a capacity of about seven beaters. It is then pumped to a Jones midget jordan that is equipped with a stainless steel filling. Also of stainless steel are the mixing box and stock lines. Pyrex glass pipe inserts allow visual observation of the flow.

The stainless steel headbox is equipped with ends of Pyrex glass plates so that stock flow can be studied. The second baffle is completely adjustable, both vertically

News of the Industry . . .

UNIQUE GLASS-ENDED headbox on Knowlton's pilot-size fourdrinier. The second baffle (right) is completely adjustable

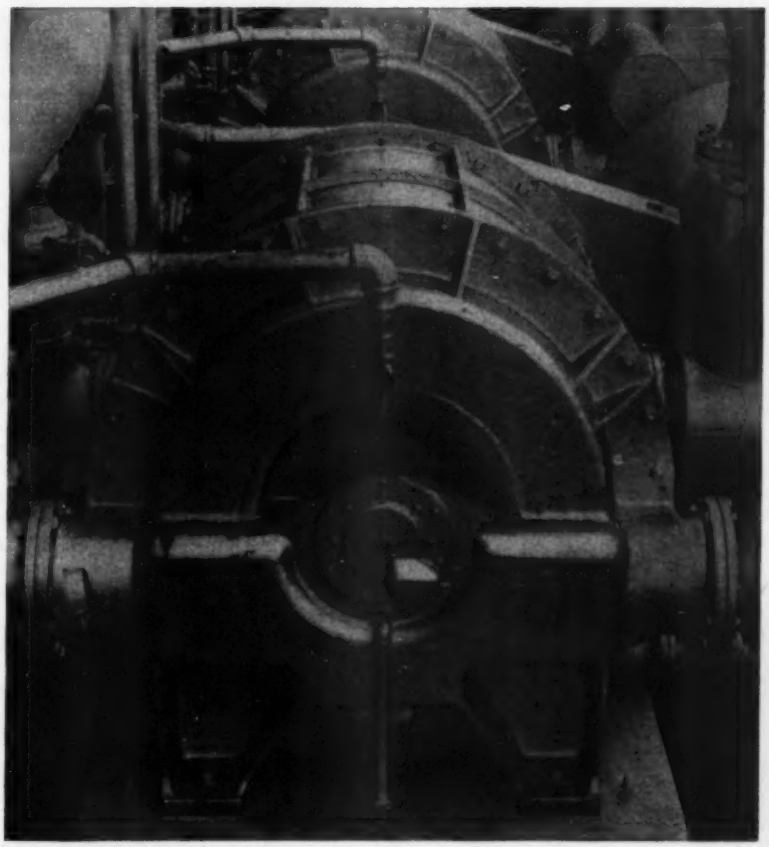
ANOTHER VIEW of the pilot-size fourdrinier with the wet end in the foreground and the press section and dryers at the rear

and horizontally, providing variable control over flow conditions. The headbox was fabricated to Knowlton specifications by Artisan Metal Products Inc. of Waltham, Mass.

The 60 x 40 mesh wire is 24'6" in length and 24 in. wide. The deckle can be varied within trim limits of 12 to 18 in. There are four flat suction boxes, all equipped with Synthane phenolic laminate tops. The shake is adjustable as to stroke and frequency over a wide range.

Usually, the machine will be operated with a 14-in. Bagley-Sewall

High machine speeds? High temperature headbox stock? You need NASH Vacuum Pumps!



Air from the suction rolls on paper machines carries with it substantial quantities of moisture. This considerably reduces the effective air handling capacity of any vacuum pump except the Nash. In the Nash Vacuum Pump, because of the unique principle of operation, the bulk of this vapor is effectively condensed inside the pump. The total capacity of a Nash is therefore increased.

When you specify a Nash Pump it can be closely sized to the job. It is not necessary to select an over-sized unit, because the rated capacity of the Nash may be relied upon.

That is one of the reasons why Nash Vacuum Pumps are installed in over a thousand leading Paper Mills. An engineer from Nash will be glad to survey your mill, and make recommendations, entirely without obligation to you.

NASH ENGINEERING COMPANY

441 WILSON ROAD, SO. NORWALK, CONN.

suction couch. However, this can be interchanged with a 14-in. brass solid bottom couch operating in conjunction with a rubber-covered top couch roll of the same size.

The miniature has two presses of conventional design, each with a 14-in. rubber-covered bottom roll and a brass top roll of the same diameter. The second press operates in the reverse direction and can be used for creping. (Couch and press rolls have been built to the same diameter as those on the Knowlton production equipment, so that nip pressures correspond to those obtained on the large machines.)

There are 12 stainless steel-jacketed dryers, each 16 in. in diameter, designed to operate at steam pressures up to 50 lbs. Space has been provided for a four-roll calender stack.

The machine is driven by a 15-hp motor driving a line shaft through an adjustable Worthington speed selector. Speed can be varied from 10 to 60 fpm, while the speed ratio between the units can be adjusted within a 3-to-1 range.

The pilot unit was designed entirely by the Knowlton staff and was built in the firm's machine shop under the direction of Roland A. Hoppe, plant engineer.

Western Michigan to Offer Courses on Coated Paper

Two three-week courses on the principles and practice of coated paper manufacture will be offered between June 20 and July 29 at Western Michigan College in Kalamazoo. The announcement was made by Dr. Alfred H. Nadelman, head of the paper technology department.

All aspects of coating are to be considered: raw materials, methods of manufacture and testing on the finished product. Included in the concentrated program will be lectures, laboratory work, and mill visits. In addition to Dr. Nadelman, instruction will be given by Robert T. Elias and Robert N. Zabe of the college faculty and various speakers from the industry.

Wellington Fund Increases Pulp, Paper Investment

The good earnings outlook or attractive yields shown by pulp and paper securities during the past year has been cited by the Wellington Fund as the reason for its increased investment in the industry.

The Philadelphia investment firm increased its holdings in pulp and paper equities by $2,236,375 during the last half of 1954 to $9,562,750 at year-end.

Seven pulp and paper manufacturing firms are represented in the Wellington portfolio. The largest single investment consists of 33,000 shares of Scott Paper Co. Other holdings include: 34,000 shares of Rayonier Inc.; 18,900 of International Paper Co.; 25,000 of Crown Zellerbach Corp.; 14,000 of Union Bag & Paper Corp.; 12,000 of Container Corp. of America, and 15,000 of Marathon Corp.

National Gypsum Enlarges Long-Range Expansion

National Gypsum Co. has revealed that it now plans to spend between $12,000,000 and $15,000,000 yearly for growth over the next five years. The announcement was made by Melvin H. Baker, board chairman.

The figures reported by Mr. Baker represent a substantial expansion over plans announced a year ago. At that time National Gypsum announced that it would spend between $30,000,000 and $35,000,000 for expansion during a period of from three to five years.

In his latest report, Mr. Baker said that, "construction of new plants to supply shortages in specific markets will be more important than buying companies making products not produced (by National Gypsum)."

ARCHITECT'S conception of new paper mill to be built by P. H. Glatfelter Co. at Spring Grove, Pa.

Glatfelter Expansion

Further details on its $12,500,000 expansion program have been recently released by P. H. Glatfelter Co. of Spring Grove, Pa.

Keystone in the project, which will increase paper output by 50 per cent, will be the installation of a Rice Barton Corp. paper machine. The unit will be one of the fastest machines of its type in the book and bond field, producing paper 176 in. in width at speeds of from 500 to 2000 fpm.

Additionally, a Combustion Engineering Inc. boiler is to be installed in the completely new mill building that will be erected to house the paper machine and finishing facilities. The unit will produce 250,000 lbs. steam per hour.

Glatfelter will also construct a 1 billion-gal. water storage reservoir about 1½ miles north of the plant. Some 137 acres have been secured for the watershed, and surveyors have made test diggings prior to the erection of a dam. Water stored in the man-made lake will be used for both the paper mill and the requirements of Spring Grove residents.

At the present time, the annual output of Glatfelter is 70,000 tons. When the current expansion program is completed in 1956, that production will be raised to some 103,000 tons.

Wax Paper Fumes Called Cause of Fatal Blast

Fumes from over-heated wax paper have been blamed for an explosion at Schwartz Paper Co. in Muncie, Ind., that killed three firemen. The cause was determined in a study undertaken by members of the science faculty at Ball State Teachers College and local fire department officials.

A department inspector reported that various types of paper stored in the building emitted fumes and gases generated by heat from a fire in an adjoining section. These fumes and gases—mixed with proper amounts of oxygen—were touched off when flames approached the storage area.

In their report, Ball State professors declared that a gas similar to fumes from kerosene or fuel oil was produced by the heated wax paper. At the same time, they said, other paper types in the area generated a gas similar to heating gas.

New Bagley-Sewall Unit in Operation in Finland

United Paper Mills at Kaipola (Jamsa), Finland, has put into operation its new Bagley-Sewall 290-in., 2200-fpm vacuum pickup newsprint machine. The unit is entirely hydraulically controlled.

New and "unique" features include: a new type stainless enclosed headbox with a speed range of 450 to 2200 fpm; a non-removable permanent cantilevered stainless steel fourdrinier with a hydraulically operated Simplex wire changing unit; a new design vacuum pickup press section com-

pletely hydraulically controlled; hydraulic dryer felt stretchers; a hydraulically operated enclosed calender stack, and a new type uniform-speed reel.

Wisconsin Mills Protest Rail Line Abandonment

Representatives of two Wisconsin paper mills are members of a committee that is protesting the abandonment of a section of the Milwaukee Road's line in the northern part of the state.

Paper mills and other industries in the Wisconsin River Valley contend that the abandonment of the line between Heafford Junction and Minocqua would be harmful since it would prevent rail shipments from vast timber holdings. Such holdings consist largely of hardwood, and it was pointed out by F. G. Klip that these woods are "just coming into their own" as far as Wisconsin papermaking is concerned. Mr. Klip is manager of timber operations for Nekoosa-Edwards Paper Co. at Port Edwards, Wis.

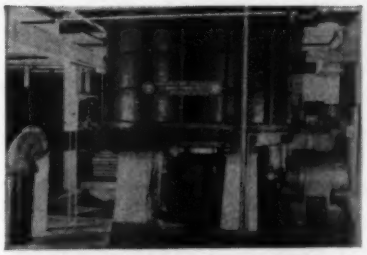
Among mills that would be most affected by the action are, in addition to Nekoosa-Edwards, Marathon Corp., Wausau Paper Mills Co. and Mosinee Paper Mills Co.

Abitibi Technicians Advise New Zealand Mill

Staff technicians of Abitibi Power & Paper Co. Ltd. are in New Zealand, where they are assisting in personnel training and advising on technical problems for Tasman Pulp & Paper Co. Ltd. Tasman is constructing the dominion's first newsprint mill and has a contract with Abitibi for the advisory service.

Abitibi staff members who left recently for New Zealand were T. C. Anderson of Toronto, Abitibi manager of the Tasman project; H. W. Temple, supervisor of training; J. Rennie, training assistant, and J. J. McGibbon, engineer. They will remain overseas one year.

The Canadian-designed mill will cost $42,000,000. It is being constructed at Kawerau on North Island. Production will include an annual 75,000 tons of newsprint and 36,000 tons of sulfate pulp, with operation on a 24-hour schedule.



BURROWS Paper Corp. has installed a Downingtown Mfg. Co. Fibrepulper at its Little Falls, N. Y. mill. The unit is installed on the third floor of the plant, which is located on a steep hillside. The mill is served by a railroad siding on the fourth floor level, where stock is charged into the pulper. The capacity of the new unit is 48 tons per 24 hours

PI Expansion Notes . . .

Canadian International Paper Co. has started expansion at its La Tuque, Que., paper mill at an estimated cost of between $15,000,000 and $20,000,000. The firm also plans to build a $2,000,000 container factory near Montreal.

Diamond Match Co. is negotiating for the use of the Harrisville, N. Y., pilot plant of St. Regis Paper Co. Diamond, it is reported, will do research on the use of hardwoods for pulp.

Gardner Board & Carton Co. of Middletown, Ohio, has purchased Yoder Engraving Co. of Hamilton. The plant will be moved to Middletown, where the firm will continue to serve the printing trade, operating as a wholly-owned Gardner subsidiary. Yoder will also continue to supply the engravings used by Gardner in carton manufacturing.

The Philip Carey Mfg. Co. of Lockland, Ohio, has purchased Lehon Co., Chicago manufacturer of asphalt roofings, roof coatings and other felt products. Lehon will become a subsidiary of the Ohio firm.

E. B. Eddy Co. Ltd. plans a $5,000,000 mill modernization program in the Hull-Ottawa area. According to the Hull, Que. firm, the board and groundwood mills will be the units most affected.

Sonoco Products Co. of Hartsville, S. C., will establish a branch plant

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Chemipulp's high degree of chemical, mechanical and physical control over materials and operations results in maximum plant output, high pulp quality, and low operating costs.

- Circulating Systems
- Chip Distributor
- Chip Pretreatment
- Waste-Liquor SO_2 Gas and Heat Recovery
- Stripping Towers
- Tail Gas Towers
- Hydroheater
- Spray-Type SO_2 Gas Cooling System
- Acid System (Bubble Absorption)

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News of the Industry . . .

at Longview, Texas. Output will include products for textile and paper mills in the area, as well as the firm's full line of construction products.

Paw Paw Valley Paper Corp. is a newly incorporated firm at Parchment, Mich. The company will manufacture and sell pulp and paper products.

Alton Box Board Co. of Alton, Ill., has announced the consolidation of two subsidiaries under the name Alton Boxmakers Inc. The new unit combines the operations of Shultz Folding Box Co. of Pacific, Mo., and the folding carton division of Acme Folding Box Co. of St. Louis.

United States Gypsum Co. plans to build a multi-million dollar plant in Houston, Texas, for the manufacture of paper used in making gypsum board.

Martin Paper Products Ltd., a subsidiary of Powell River Co. Ltd., has started operations at its recently completed plant in New Westminster, B. C. Corrugated containers will be produced at the $1,000,000 operation.

Green Bay Paper & Pulp Co. is adding a roll storage section to the machine room and is expanding the boiler room at a total cost of $73,000. The latter will house a Babcock & Wilcox "package" oil-burning boiler with an hourly steam capacity of 28,000 lbs.

REPRESENTING THE PAPER industry on the new NBC television series "Operation Success," George W. Scrimshaw (r), president and chairman of the board of Krafco Container Corp., discusses plant operation with Quentin Reynolds, host on the TV series

Robert Gair Co. Inc. of New York, N. Y., will establish a corrugated box plant in Atlanta. Equipment will include a combiner and necessary auxiliary equipment for the manufacture of all types of corrugated shipping containers. The plant will receive paperboard from the firm's new kraft mill at Port Wentworth, Ga.

The Ozalid Div. of **General Aniline & Film Corp.** will construct a combination warehouse and paper finishing building at Johnson City, N. Y. Cost of the completely equipped building will probably be about $1,000,000.

Kaumagraph Co. of Wilmington, Del., has purchased the printing and converting department of **Scott Paper Co.'s** Detroit Div. (formerly Detroit Sulphite Pulp & Paper Co.). The equipment is to be transferred to Wilmington.

American Box Co., Cleveland, Ohio, is expanding its facilities to include the production of corrugated containers at its main plant. This will supplement the firm's output of wirebound, cleated-panel and nailed-wood containers. New equipment is being installed, and full capacity is expected this year.

Bird & Son inc. has opened a $2,500,000 roofing and granule plant at Charleston, S. C. Production will include asphalt shingles, roll roofing, siding, insulating material, roof coating and cement.

United States Gypsum Co. plans to build a multi-million dollar wallboard plant at Stony Point, N. Y. According to the New York State Department of Commerce, construction will begin immediately on a 50-acre tract fronting the Hudson.

Hammermill Paper Co. of Erie, Pa., has changed from a six- to seven-day operation in order to protect its competitive position. Continuous operation of the paper machines will result in the employment of about 115 additional workers.

Riegel Paper Corp. of Milford, N. J., is adding to its coating department to make room for a third coating tower, a combination unit capable of both standard and reverse roll coating.

St. Regis Paper Co. will transfer its polyethylene coating equipment from the Carthage, N. Y. kraft paper mill to the kraft center at Pensacola, Fla. This is a further step in the firm's efforts to concenrate kraft pulp, paper and multiwall bag manufacture in the South.

Specialty Papers Co. of Dayton, Ohio, will erect a $1,250,000 plant for the fabrication, waxing and printing of paper packaging materials.

Milprint Inc., Milwaukee manufacturer of flexible packaging, has opened a new 50,000-sq. ft. plant at Downingtown, Pa.

U. S. Paper and Paperboard Production

	Jan. 1955 (tons)	Dec. 1954 (tons)	Jan. 1954 (tons)	Total 1954* (1,000 tons)	Total 1949
Paper and Board, total	**2,337,850**	**2,160,898**	**2,168,213**	**26,657**	**20,315**
Paper, total	1,036,326	963,720	978,819	11,615	9,198
Newsprint	110,530	111,016	95,149	1,191	918
Groundwood paper (uncoated)	70,206	69,569	67,739	808	675
Printing and converting (coated)	105,333	95,364	104,653	1,215	887
Book paper (uncoated)	138,629	125,840	133,499	560	1,416
Fine paper (writing, cover and text, bristols, thin paper and other)	122,240	118,147	103,041	1,324	1,015
Coarse paper (unbleached kraft, glassine, greaseproof, vegetable parchment and other)	300,047	278,058	297,093	3,429	2,758
Special industrial paper (including absorbent paper)	51,290	47,770	43,234	526	334
Sanitary tissue stock	117,780	99,621	112,109	320	1,008
Tissue paper (except sanitary and thin paper)	20,271	18,335	22,312	241	187
Paperboard, total	1,053,096	959,802	939,341	12,047	8,997
Container board, total	578,470	514,315	527,772	6,433	4,680
Liners	391,052	340,925	364,092	4,336	3,132
Corrugating material	161,033	148,824	141,974	1,817	1,306
Container chipboard	26,385	24,566	21,706	280	242
Bending board	305,207	290,935	298,291	3,671	2,613
Nonbending board	77,938	68,106	76,174	920	748
Special paperboard stock	84,940	79,940	80,497	944	873
Cardboard	6,541	6,506	6,607	79	83
Wet machine board, total	11,845	11,544	11,691	132	131
Construction paper and board, total	236,583	225,832	188,362	2,863	1,990
Construction paper	97,907	103,058	87,243	1,356	1,151
Hardboard and insulating board	138,676	122,774	101,119	1,507	839

*Preliminary report. *Source: U. S. Department of Commerce.*

Announcing the NEW **HANCHETT**

MODEL SK-24

SLITTER KNIFE GRINDER
for
Top or Bottom SLITTERS
WET GRIND

- *finest finishes*
- *extreme accuracy*
- *rigid construction*
- *capacity 3" to 24" diameter*
- *semi or fully automatic*
- *positive and accurate fixturing*

HANCHETT MANUFACTURING COMPANY
World's Largest Manufacturer of Knife Grinding and Saw Sharpening Machinery
MAIN OFFICE — Big Rapids, Michigan WEST COAST — Portland 1, Oregan

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LININGS and TILE TANKS

The experience of practically all companies in the pulp and paper industry proves that it will pay you to put your corrosion-resistance problems in the hands of Stebbins specialists. Complete service, from original design to year-round maintenance. Get the facts. Write for Bulletin A-153.

STEBBINS SEMCO
Engineering and Manufacturing Company, Watertown, N. Y.

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1896

SODIUM CHLORATE
for Chlorine Dioxide Bleaching of Pulp

Oldbury Sodium Chlorate means not only utmost quality and uniformity but the finest in technical service.

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ELECTRO-CHEMICAL COMPANY
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ALLIED NEWS

American Industrial to Make Reilly Vacuum Slice

Franklin J. Reilly has announced that the manufacture and sale of his newly patented vacuum slice has been placed in the hands of American Industrial Co. of Buffalo, N. Y.

According to Mr. Reilly, this vacuum slice is particularly valuable in the press nips of cylinder board machines using standard press rolls.

Swedish Contract to Shartle

The Shartle Bros. Machine Div. of the Black-Clawson Co. has received contracts to supply eight Selectifier screens to the Kvarnsveden mill of Stora Kopparberg Bergslags A. B. at Falum, Sweden. The Swedish mill operates seven newsprint machines and is also a leading manufacturer of wood pulp.

Constructed entirely of stainless steel, the pressure machine screens are totally enclosed and will handle the entire flow of stock going onto the wire of Stora Kopparberg's new high-speed newsprint machine that will go into operation next year.

National Starch to Expand

National Starch Products Inc. has announced that it will enter upon a long-range program for the expansion and modernization of all company manufacturing and research facilities. The $3,500,000 plan will provide for:

(1) New and modernized equipment at Plainfield, N. J., Chicago and San Francisco; (2) expansion and modernization of buildings at Indianapolis; (3) 100 per cent expansion of the Alexander Research Laboratory at Plainfield, and (4) general equipment improvements.

Allied News Notes . . .

Stein, Hall & Co. Inc.—through its wholly owned subsidiary, Eastern Maine Starch Co. Inc.—has purchased the plant and equipment of Limestone Starch Co. in Limestone, Maine. The plant will continue to manufacture potato starch.

A new quality control laboratory is in full operation at the **Babcock & Wilcox Co.'s** Tubular Products Div. in Beaver Falls, Pa. Completely equipped with all modern inspection and testing equipment, the laboratory comprises 29,000 sq. ft. of floor space.

Oldbury Electro-Chemical Co. has announced that new facilities are now ready at its Mississippi plant for the production of phosphorus pentasulfide. The plant was originally designed for the production of sodium chlorate alone.

SEVENTH BIRTHDAY for Seybold air jets was celebrated recently at the Harris-Seybold Co. Dayton, Ohio plant. To mark the installation of more than 34,000 air jets in Seybold air-film cutter tables, the first user was represented at the Dayton factory by W. F. Weaver (r), superintendent of the finishing room at Aetna Paper Co. He is looking at air jet No. 34,000-plus held by R. I. Haywood, chief engineer for the Seybold Div.

E. I. duPont deNemours & Co. has reported that it will increase the output of titanium dioxide at the Edge Moor, Del. plant. The work is to be completed late next year, but part of the new facilities will be in production before that time.

A. E. Staley Mfg. Co. of Decatur, Ill., will construct a $200,000 warehouse and sales office building in Chicago. Completion of the 30,000-sq. ft. building is expected in October.

Atlas Powder Co. has opened its new general offices in Wilmington, Del.

Dean Bros. Pumps Inc. of Indianapolis held its 1955 sales and engineering clinic in the firm's laboratory and test floor. Some 40 agents, sales engineering representatives and company personnel participated.

Whiting Corp. (Canada) Ltd. has opened a new district office in West Montreal, Que., with Joseph V. Rozycki in charge.

Worthington Corp. is establishing a separate division at Harrison, N. J., to be known as the Standard Pumps Div. It will be responsible for all functions relating to the sale, engineering and production of standard pumps, consisting largely of small centrifugal and rotary types. General manager is Vincent Gerbereux, former manager of the Centrifugal Pump Div. in the general sales department.

ACF Industries Inc. has announced the completion of additional facilities for the production of pressure vessels. The facilities include a $1,000,000 flanging press for the production of a wider range of storage tanks and pressure vessels.

DeZurik Shower Co. of Sartell, Minn., has opened a regional sales office in Pensacola, Fla. Cleve Fair is in charge.

F. C. Huyck & Sons of Rensselaer, N. Y., has announced that the Kenwood felt measuring wheel is now available to all manufacturers of paper machine felts. Designed specifically to provide the paper industry a means of determining the operating stretch of a felt, the wheel is also employed to locate sources of undue strain or excessive loading that adversely affect felt life.

Black-Clawson Co. has been granted patents covering a new selective zone hardening process for heat-treating the working surface of jordan bars. The process, termed "Flint 32," has been applied to both plug and shell bars. They are available for all makes and sizes of jordan plugs and fillings through the Shartle Bros. Machine Div. at Middletown, Ohio.

Bulkley, Dunton Processes Inc. of New York, N. Y., has announced the appointment of Jean Paul Rolland of Montreal and Charles E. Napier Co. Ltd. of Toronto as the firm's Canadian representatives.

Burgess Washington Clays Ltd. of Sandersville, Ga., celebrated its 10th anniversary in January. Founded in 1945 by Malcolm S. Burgess, the firm was subsequently leased to Thiele Kaolin Co. for operation.

Consolidated Machine Tool Corp., wholly owned subsidiary of **Farrel-Birmingham Co. Inc.,** has been dissolved as a separate corporation. Its business and activities are being conducted as a division of the parent company.

Emerson Mfg. Co., a division of John W. Bolton & Sons Inc., has completed arrangements whereby **Pulp & Paper Mill Accessories Ltd.** of Montreal is licensed to manufacture and sell Emerson shower pipes in Canada on an exclusive basis.

Additional manufacturing facilities for the production of wet-strength resins for paper will be built at its Holyoke, Mass. plant by the Paper Makers Chemical Department of **Hercules Powder Co.** Operation is expected in the second quarter of this year.

Black-Clawson Divisions Announce Appointments

Three divisions of the Black-Clawson Co. have announced appointments in their sales departments:

William T. Schick, formerly sales engineer for the Shartle Bros. Machine Div. in the Pennsylvania-New Jersey area, has been named assistant to the division sales manager, Don H. Montville. A member of the B-C organization since 1948, Mr. Schick will assume responsibility for sales department functions to assure prompt customer service.

In another Shartle appointment, Bruce

W. T. Schick

B. D. Hartel

J. E. Dain

J. M. DeCew

D. Hartel has been named to assist Gordon Petrie, B-C west coast sales manager. Mr. Hartel will represent Shartle interests in the western area. At one time on the staff of Buffalo Pump Co., he will specialize in stock preparation equipment to augment the company-wide representation now being handled by Mr. Petrie.

Dilts, Pandia Announcements

To further augment its winder-slitter development program, the Dilts Machine Works Div. of B-C has added John E. Dain to its sales staff. A veteran of 20 years in sales and service, his most recent assignment has been that of sales manager for the southern division of Cameron Machine Co. (The Dilts winder-slitter program incorporates the addition of the former line of Bagley-Sewall converting winders to its extensive line.)

Tany Agronin, general manager of the Pandia Inc. Div., has reported that J. M. DeCew has joined the divisional sales staff. Formerly sales engineer for Oliver United Filters, Mr. DeCew will specialize in the promotion and sales of the new Strindlund vacuum tube-type filter recently added to the Pandia line.

Allied Personalities

D. T. Bixby has been named sales manager of the Standard Products Div. of De Laval Steam Turbine Co., Trenton, N. J. He was previously sales manager at Seattle.

Joseph P. McTommoney has been named vice president and general manager of Moore & White Co. of Philadelphia.

C. Dana McCoy has been named New York manager and international director of the Rust Enginering Co., Pittsburgh. He was formerly director of the International Div. of Foster Wheeler Corp.

A PUMP PACKING THAT'S EXPENSIVE, BUT *CHEAP!*

Heavy Teflon† impregnation throughout
Choice of Canadian white asbestos or blue African asbestos
Unique LATTICE BRAID* construction plus Teflon core

Lasts at least *3* times longer than ordinary pump packings

Frankly, the service reports on LATTICE BRAID asbestos packing with Teflon surprised us! Originally designed and test-proven for use against severe acids, caustics, and other chemicals, this particular packing has out-performed other packings (*even our own*) on more common applications against water, steam, solvents, and oils.

And here's why: (1) The LATTICE BRAID construction gives greater strength; (2) The Teflon core and heavy Teflon impregnation resist everything except molten alkali metals and some freons; (3) It does not adhere to the shaft or rod; (4) It runs smoother and freer than packings without Teflon.

Check these typical service reports:

- Against blending waxes and steam (for cleaning), it outlasted another Garlock style 10 to 1
- Against caustic at 325°F., 50 p.s.i., it outlasted competitive packing 38 to 1
- Against cold water, it out-performed other packings 3 to 1

LATTICE BRAID with Teflon is available in either Canadian white asbestos (style 5861) or blue African asbestos (style 5880). Each is furnished in packing sizes 5/16" to 1½" graduated by sixteenths.

Try an order of 10 feet or more today. Chances are you can *reduce* down-time, maintenance and replacement costs to *one-third* of their present amount.

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK

Sales Offices and Warehouses: Baltimore • Birmingham • Boston • Buffalo Chicago • Cincinnati • Cleveland • Denver • Detroit • Houston Los Angeles • New Orleans • New York City • Palmyra (N.Y.) Philadelphia • Pittsburgh • Portland (Oregon) • Salt Lake City • San Francisco • St. Louis • Seattle • Spokane • Tulsa.
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GARLOCK LATTICE BRAID with TEFLON

DeZURIK AUTOMATIC-RECORDING CONSISTENCY REGULATORS

DEPENDABLE Without interruption, without constant, time-consuming maintenance, despite spattering stock, DeZurik Regulators deliver consistently uniform stock on any system. Three basic types provide a wide range of box design to fit any installation, handling a wide range of consistencies and tonnages. No levers, joints or bearings are exposed to the stock — no rapidly moving or delicate parts to require frequent adjustment.

ACCURATE Thousands of DeZurik Regulators are operating on stock going direct to paper machines and holding the regulated consistencies within limits of plus or minus .1%. Response is instantaneous to any change in incoming stock and control elements are air operated to provide maximum sensitivity.

AUTOMATIC The operation of DeZurik Regulators is completely automatic. The controller-recorder delivers a 24-hour recording of both incoming and outgoing consistencies. Changes in consistency are easily set with a single knob — no other adjustments are required — no further attention needed! (Also available: The Closed Stock System, an engineered, package unit that eliminates five points for air entrainment common to conventional installations. Advantages include more uniform basis weight, higher machine operating speed, improved sheet formation.) Write for details!

DeZURIK SHOWER CO. SARTELL MINNESOTA

FDD

TO THE RESCUE

Every paper machine builder in the land recognizes the incompleteness of his dryer section without Fulton Dryer Drainage. That's why almost every machine built in recent years has included FDD to improve dryer performance.

That's why hundreds of older machines—even small ones—have also installed FDD. That's why close to 1000 Fulton systems have been installed to date.

Proper graduation of drying temperatures • Uniform drying regardless of speed • Less broke, shrinkage, cockle or curl • Faster drying, conditions permitting • Important cut in steam costs.

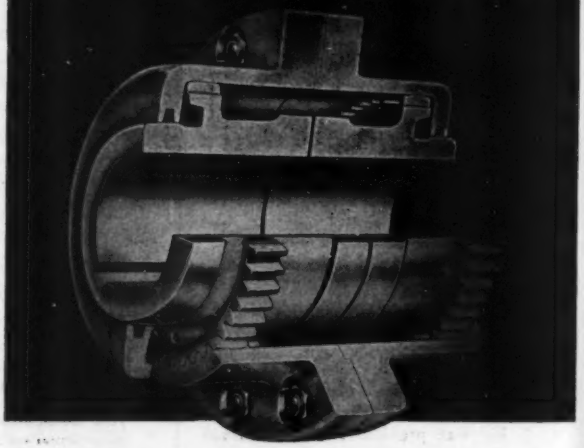
Regardless of the age or size of your paper machine, a Fulton Dryer Drainage system would make you money.

ROSS MIDWEST FULTON CORP.

DAYTON, OHIO

A subsidiary of J. O. Ross Engineering Corporation

POOLE



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FLEXIBLE COUPLINGS

POOLE FOUNDRY & MACHINE COMPANY WOODBERRY, BALTIMORE, MD.

ASSOCIATION NEWS

Superintendents Divisions Announce Fall Meetings

Three divisions of the Superintendents Association have announced dates for their 1955 fall meetings:

Northeastern Division, September 22-24, Poland Spring House, Poland Spring, Maine; Pacific Coast Division, December 1-3, Winthrop Hotel, Tacoma, Wash.; Northwestern Division, September 16-17, Hotel Northland, Green Bay, Wis.

Tentative Program for Sixth Coating Conference

The tentative program for the Sixth Annual Coating Conference that is to be held at the Hotel Statler in Cleveland May 23-25 has been announced by Lloyd H. Silvernail. Mr. Silvernail is publicity chairman for the Coatings Committee of Tappi.

Principal speaker at the annual luncheon on May 24 will be George F. Ferguson, president and general manager of Watervliet Paper Co. of Watervliet, Mich.

Most of the speakers have been announced, although several papers have yet to be scheduled. The tentative list of speakers and their topics is as follows:

R. M. K. Cobb and J. Rice of Lowe Paper Co., "Varnishing Characteristics of Coated Board;" John Gunning of Provincial Paper Co. Ltd., "De-airating of Coating Color;" John Swenson and Glen Hemstock of the Institute of Paper Chemistry, "Mineral Species in Coating Clays and their Relationships to Flow Properties at High Solids Content."

B. W. Rowland of Georgia Kaolin Co., "Progress Notes on Machine Coating;" Swanson and Hemstock of the Institute, "Clay Deflocculation and its Effect on the Flow Properties of Clay Slips;" R. W. Hagemeyer of Wyandotte Chemical Corp., "Calcium Carbonate Pigments;" Hagemeyer and George Hall of Wyandotte, "Applications of Calcium Silicates in Paper Coatings;" W. R. Willets and L. E. Georgevits of Titanium Pigment Corp., "Some Aspects of Dispersion;" R. S. Lamar and M. F. Warner of Sierra Talc & Clay Co., "Some Fundamental Properties of Commercial Talcs and their Application to Papermaking."

M. J. Landberge of General Dyestuff Corp., "Tinting and Coloring of Water Vehicle Coatings;" M. C. Rogers of R. R. Donnelly & Sons Co., "Effect of Various Pigments on Printing;" R. F. Reed of Lithographic Technical Foundation.

Coming Events

Tappi

April 28—Delaware Valley Section, Engineers' Club, Philadelphia
May 10—Lake States Section, annual social meeting
May 12—Ohio Section, annual dinner-dance, Hartwell Country Club, Cincinnati
May 13-14—Southeastern Section, De-Soto Hotel, Savannah, Ga.
May 18-21—Western International Meeting of Pacific Coast Section with Pacific Coast Superintendents and Pacific Coast CPPA, Empress Hotel, Victoria, B. C.
May 22-25—Sixth Coating Conference, Statler Hotel, Cleveland
June 9-11—Empire State Section, annual meeting, Whiteface Inn, Lake Placid, N. Y.

American Pulp & Paper Mill Superintendents Association

April 23—Michigan Division, Hotel Harris, Kalamazoo
May 13—Connecticut Valley Division, Roger Smith Hotel, Holyoke, Mass.
May 17—Miami Valley Division, Middletown, Ohio
May 18-21—Western International Meeting of Pacific Coast Division with Pacific Coast Tappi and Pacific Coast CPPA, Empress Hotel, Victoria, B. C.
May 20-21—Pennsylvania-New Jersey-Delaware Division, Hotel Lawrence, Erie, Pa.
June 14-16—National Meeting, Netherland Plaza Hotel, Cincinnati

Other meetings

May 2-5—Electrochemical Society Inc., Sheraton-Gibson Hotel, Cincinnati
May 18-21—Third International Meeting of the Pulp & Paper Industry, Empress Hotel, Victoria, B. C.
May 31-June 3—Third Basic Materials Exposition, Convention Hall, Philadelphia
June 6-8—CPPA Technical Section, summer meeting, Chateau Frontenac, Quebec City

PERMAG FOR EFFICIENT PAPER MACHINE CLEANING
For every cleaning need there is a PERMAG CLEANING COMPOUND—production proven in extensive use for top efficiency, economy and reliability under all conditions. More than 30 years of development and service in superior cleaning compounds warrant your investigation of these widely approved PERMAG products.
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SUCTION COUCH ROLL
FOURDRINIER PART
SCREEN
HEAD BOX
VERTEX
JORDAN
BEATER
BEATER CHEST
MACHINE CHEST
MIXING PUMP

NAMES *in the* NEWS

Kassing Named to Nepco Post

Burt L. Kassing, former director of process and product development for Nekoosa-Edwards Paper Co., has been named manager of the firm's new production planning department.

Mr. Kassing will be in charge of all planning and scheduling of production operations. He joined the Nepco staff in 1950 with a diversified background of more than 30 years in the industry. He had been superintendent at Hammermill Paper Co. in Erie, Pa.; a professor at the New York State College of Forestry, and general manager at Ecusta Paper Corp.

B. L. Kassing

R. W. Wood

Wood Named Safety Supervisor for K-C

Robert W. Wood, for the past two years procedures analyst in the industrial relations department, has been named staff safety supervisor for Kimberly-Clark Corp. He succeeds Konrad S. Tuchscherer, who is being transferred to the firm's Memphis, Tenn. mill as personnel superintendent.

Mr. Wood has been associated with Kimberly-Clark for 29 years. For 13 years he was on the operations staff at the Badger-Globe unit of the Neenah, Wis. mill. He became engaged in personnel work in 1940 and specialized in accident prevention at the Lakeview mill until 1947, when he returned to Badger-Globe for a three-year period prior to his appointment in 1950 as head operating personnel man for the Neenah mill.

Other K-C Appointments

Kimberly-Clark Corp. has also announced the appointments of Abbott Byfield as director of development in research and development and of Richard B. Sawtell as manager of market research and product planning.

Mr. Byfield joined K-C in 1939. From 1945 to 1950 he was superintendent of the pilot plant operation in the research department. In 1950 he joined the sales department as staff research specialist and more recently has been manager of product development. Mr. Sawtell joined the firm in 1933 and has been merchandising manager in the sales department.

Nazzaro Promoted by Westfield River

Dr. Ralph T. Nazzaro has been elected vice president of research and development for Westfield River Paper Co. Inc. He became technical director of the firm in 1951 after having served three years as associate professor in forest chemistry at the New York State College of Forestry in Syracuse.

Prior to joining the Syracuse faculty, Dr. Nazzaro had been technical director of Premoid Products Inc. and a fellow at the Mellon Institute in Pittsburgh. He is chairman of the plastics committee of Tappi.

R. T. Nazzaro

F. B. Doherty

Fred B. Doherty has been appointed to the newly created position of general manager of southeast cellulose manufacturing for Rayonier Inc. He was formerly resident manager of the firm's Fernandina Beach, Fla. plant. He joined Rayonier as a pulp tester in Hoquiam, Wash., in 1933.

Wis. Paper Group Elects

R. W. Mahoney, president and general manager of Appleton Coated Paper Co., has been elected 1955 president of the Wisconsin Paper Group. He succeeds G. E. McCorison of Thilmany Pulp & Paper Co. The organization includes 35 paper manufacturers and converters that provide scheduled pool carload deliveries to customers in the United States.

Other officers named: W. J. Van Dyck of Badger Paper Mills Inc., vice president; Leo O. Schubart of Neenah Paper Co., reelected secretary-treasurer for the 22nd year, and Douglas G. Hyde of Marathon Corp., R. T. Meyer of Tape Inc., C. A. Schiebler of Nekoosa-Edwards Paper Co., W. L. Thornton Jr. of Kimberly-Clark Corp., John Wilterding of George Banta Publishing Co., Charles Egan of Shawano Paper Mills, O. W. Johnson of Rhinelander Paper Co., and Mr. McCorison, all members of the executive committee.

T. F. Martin Jr., formerly technical director, has been named general superintendent of Hartford City Paper Co. in Hartford City, Ind. He joined the firm in 1950 as quality control supervisor following association with St. Regis Paper Co. in Deferiet, N. Y., and Container Corp. of America at Wabash, Ind.

T. F. Martin Jr.

R. W. Kumler

Ralph W. Kumler has been elected secretary-director of the Waste Paper Utilization Council. Mr. Kumler comes to the Council from his post as consultant to Foster D. Snell Inc. He was formerly technical director of the paper chemicals department of American Cyanamid Co. and at one time served as superintendent of Jessup & Moore Paper Co.

A. E. H. Fair, executive vice president of Brown Co., has been elected a director of Westfield River Paper Co. Inc. He was for many years

senior executive with Howard Smith Paper Mills Ltd. and Alliance Paper Mills Ltd.

A. E. H. Fair

J. B. Talbird

Joseph B. Talbird has been named comptroller of Rayonier Inc. He was formerly assistant comptroller with offices at Jesup, Ga.

W. B. Zimmerman has been named president of Howard Paper Mills Inc. to succeed **Harry A. Legge,** whose resignation became effective January 1. Mr. Legge, who resigned for health reasons, will remain as a director and executive committee member.

Albert S. Boyers, formerly general superintendent of A & P Corrugated Box Corp. in Lawrence, Mass., has become associated with Sonoco De Mexico, S. A., as paper mill superintendent.

Necrology . . .

Glenn H. Smathers

Glenn H. Smathers, general pulp mill superintendent at the Texas Div. of Champion Paper & Fibre Co. in Pasadena, Texas, died February 25. He was 56.

Mr. Smathers became associated with Champion in 1918 as a laboratory technician at the Carolina Div. in Canton, N. C. After serving in several supervisory posts, he was transferred to the then new Texas mill in 1937. He was a member of both Tappi and the Superintendents Association.

Gustav F. Enderlein

Gustav Ferdinand Enderlein, pioneer chemist in the North American pulp and paper industry, died February 19 at the age of 76.

From 1924 until his retirement in 1950, Mr. Enderlein was a chemist with Mosinee Paper Mills Co. in Mosinee, Wis. Prior to 1924 he had been associated with several pulp and paper firms in the United States and Canada.

A native of Sweden, Mr. Enderlein came to this country in 1913. He was a life member of the Superintendents Association and a member of Tappi.

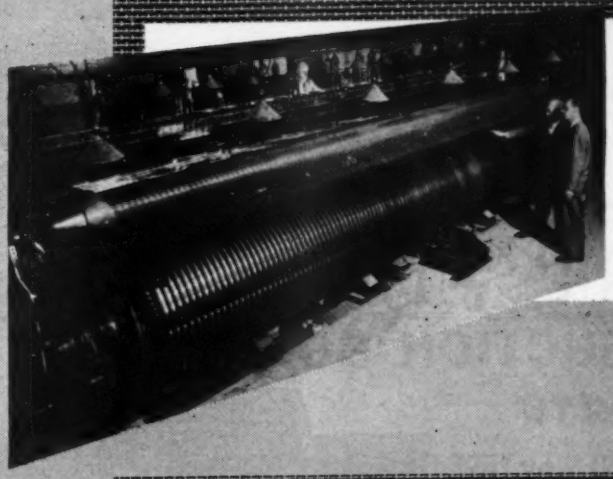
Earl L. Hobaugh

Earl L. Hobaugh, prominent mill production executive, died February 5. He had retired some years ago as general superintendent of St. Joe Paper Co. in Port St. Joe, Fla.

He began his career at the age of 13 in 1909 at Hammermill Paper Co. in Erie, Pa. In succeeding years he was associated with International Paper Co., Watab Paper Co., Minnesota & Ontario Paper Co., Crossett Paper Mills, and Union Bag & Paper Corp.

F. Earle Walker, president of J. R. Walker Co. Ltd. of Montreal, a paper mill supply firm, died January 17. He was a former director of Walker Paper Products Ltd., Black River Power Co., and South Shore Lumber Co.

there's a **GIANT** under our roof



THIS GIANT NEW LOOM—
now weaving fourdrinier wires is the largest in the United States. It can weave wires 292" wide or two 145" wires. Tomorrow may see still larger looms, but whether large, medium, or small, the objective at Eastwood-Nealley is to construct the finest and the most efficient looms in the business. The aim of our continuing modernization program and the goal of our research is to be able to anticipate and meet in advance the growing needs of the great pulp and paper industry.

Eastwood-Nealley builds its own wire weaving looms. This loom's push-button controls have made fourdrinier wire production as automatic as is possible, with the added benefit of greater precision.

EASTWOOD-NEALLEY CORPORATION
Belleville, N. J.

SAFETY NEWS

National Container Georgia Mill Receives Wausau Plaque

An outstanding safety record has won for the Valdosta, Ga. mill of National Container Corp. an award from its insurance carrier, Employers Mutuals of Wausau, Wausau, Wis.

Karl M. Guest, Valdosta plant manager, accepted an engraved plaque from H. A. Womack, Jacksonville safety engineer for the insurance firm, in a special program at the mill.

The Valdosta plant has established an accident frequency rate of 4.56, far better than the national average for the industry.

In his presentation, Mr. Womack declared that much of Valdosta's achievement in accident prevention is due to a comprehensive program of employee selection, particularly in regard to safety attitude, and the thorough initial training that new employees receive. All new workers spend several days attending lectures, viewing films and demonstrations that point out specific hazards and control measures.

Two Fraser Mills Cited By National Safety Council

The Madawaska, Maine paper mill of Fraser Paper Ltd. has qualified for an award of honor from the National Safety Council. The citation resulted from the firm's successful efforts in "significantly lowering its disabling injury rate in 1954 below the industry's rate for 1951-53."

In the contest sponsored by the NSC among pulp and paper mills in the United States and Canada, the Fraser mill led the group in its class that are receiving certificates of achievement for injury reduction. During 1954, the Madawaska mill reduced the frequency of its injuries by 85 per cent better than average and its severity by 99 per cent.

The Fraser operation also ranked fifth among the 77 entries in its class in the NSC contest and during 1954 had a lost-time accident frequency rate of 1.12. According to the Maine Department of Labor and Industry, this was the state's lowest frequency rate last year.

Honors to Newcastle

The NSC also announced recently that the Fraser kraft pulp mill at Newcastle, N. B., had won first place in its group in the 1954 safety contest. Without any lost-time accidents during the year and having the most number of man-hours in its group, the plant led in Group D of Division I in the competition. There were 55 mills entered in the class.

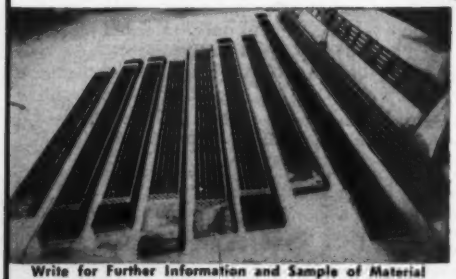
This is the second year in a row that Newcastle's 150-ton per day pulp operation has been so honored. The mill has operated without a lost-time accident since December 8, 1952.

Its 1954 performance also placed the mill in second place in its class in the Safest Mill in Canada contest sponsored by the *Pulp and Paper Magazine of Canada.* The winner, Manitoba Paper Co., had a greater number of man-hours.

The NSC also awarded the Newcastle mill a certificate of merit for reducing its disabling injury accident rate significantly below the average of the industry's and the mill's 1951-53 rates.

RES-LIN *wire saver*
SUCTION BOX COVERS
are
PROVEN by TEST

PROVEN BY TEST, this RES-LIN Suction Box Cover is establishing a new record for longer life and even wearing. It is engineered to meet the requirements of specific production problems of each particular paper machine.



10 Reasons Why You Should Use RESLIN

1. Even distribution of fabric assures EVEN WEARING.
2. Ends of threads contact wire, assuring uniform surface to wire.
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5. Resurfacing reduced to a minimum.
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7. Reslin can supply a greater open area without sacrificing strength.
8. Requires no wet storage or care when machine is down.
9. Easily installed.
10. No other can offer as even-wearing and wax-like surface as Reslin.

Write for Further Information and Sample of Material

WIRE RES-LIN SAVER

APPLETON WOOD PRODUCTS CO
APPLETON, WISCONSIN

Safety News Notes . . .

Neenah Paper Co. at Neenah, Wis., has honored its maintenance employees for completing five years without a lost-time accident. The record extends from February 21, 1950, to February 21, 1955, and the accident-free period represents more than 200,000 man-hours.

Kimberly-Clark Corp. has announced that its two mills in Niagara Falls, N. Y., completed 1954 with a safety record of 2.5 accidents per 1,000,000 man-hours worked. The plants employ a total of 1700 people.

David L. Arm, dean of the school of engineering at the University of Delaware, has been appointed manager of the industrial department at the **National Safety Council.** Prior to joining the faculty at Delaware, Mr. Arm had been associated with Ingersoll-Rand Co. and Pennsylvania Power & Light Co.

PATENT REVIEWS

MELVIN NORD*

Laminated paperboard sheet material

U.S. 2,684,314, issued July 20, 1954, to Valentine A. Ross and assigned to Chicago Cardboard Co., relates to a decorative laminated paperboard sheet material which is so treated as to be substantially free of any tendency to warp or curl, so that it may be used as a floor covering.

By forming a continuous pattern of alternate small elevations and shallow depressions which divide the sheet into a number of small areas, the fiber of the board is so broken up that its tendency to curl in either dimension is destroyed. The pattern is made by forming two sets of intersecting crease score lines in the sheet so as to give a sort of "waffle" or "checkerboard" pattern.

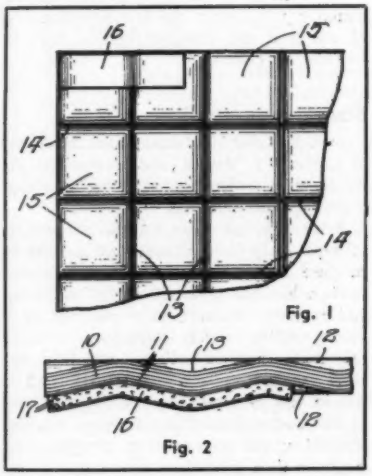


Fig. 1

Fig. 2

One corner of the sheet is shown in Fig. 1, and an enlarged view of an edge is shown in Fig. 2. The improved sheet material is composed of a laminated paperboard body 10 which may be from 0.03—0.075 in. thick and which is formed of individual laminae 11. In order to make a floor covering or display floor mat which will withstand ordinary washing and cleaning operations, the laminated paperboard 10 should be impregnated with a waterproofing compound. The preferred compound is a melamine resin.

Bonded to each surface of the laminated body 10 is a paper facing 12, the bonding material preferably being a waterproof adhesive so that the complete composite sheet will substantially resist disintegration when wet.

The paper facings may be either coated or uncoated paper, depending upon whether the finished composite sheet is to have a sharp brilliant color such as is obtained by applying the color to a coated sheet, or whether it is to have the more subdued color which is obtained by applying it to an uncoated sheet so that it penetrates the fiber paper. The paper facings may be printed or lithographed with any desired decorative design or advertising material in the ways which are conventional for the manufacture of display advertising cards.

The composite sheet with the desired decorative design or advertising display matter reproduced on it is then provided with an adherent waterproof film which covers each of its surfaces. This may be accomplished by applying two or three thin coats of transparent waterproof lacquer.

The waterproofed composite sheet is then subjected to a crease scoring operation in order to divide it into polygonal areas, each of which must be of such small dimension that no significant warping strains may occur within it. Thus, by dividing the entire sheet into such small areas, the warping tendency of the whole sheet is substantially abolished. When the scoring operation has been performed, the sheet has a number of straight parallel crease score lines 13 running continuously across it in one direction, with the score lines 13 in one surface alternating with those in the other surface. After the score lines 13 have been formed in the sheet it presents a flat, fluted appearance.

The composite sheet is then subjected to a second scoring operation to form score lines 14 at right angles to the score lines 13. These are also parallel, continuous straight score lines; but the score lines 14 are of less depth than the score lines 13. The reason for this is that if the second set of score lines is placed in the sheet at the same pressure as the first set, it partially destroys the first score lines where the intersections occur.

The finished sheet is thus divided into a number of square areas 15 so that the finished sheet presents a patterned appearance which may be described as "waffle-like," "checkerboard" or "quilted."

If the material is to be used as a floor covering, or for a floor mat display, it may be provided with fastening or anchoring means by which it may be secured to the floor. Preferably a finished sheet carries a decorative design or display material on each of its surfaces so that when one surface has become unsightly from use, the sheet may be reversed and the second side exposed. The preferred fastening means consists of small sponge rubber strips 16 which are about 1/16 in. thick, and are provided with a coating of pressure sensitive adhesive 17 on each face. Thus, the strips 16 may readily be adhered to either surface of a display device formed from the improved board, and serve to secure the device to the floor. When it is desired to turn the device over, the adhesive strips may be removed from one face and placed upon the other face so as to be reused.

Dry process for making water-resistant wallboard

U.S. 2,692,206, issued Oct. 19, 1954, to Donald F. Othmer, Edmund R. Mellinger and Warren R. Smith, describes a dry process of preparing bonded mixtures of liguocellulose fibers (such as wood) and sulfur by pressing the mixtures under the application of heat to produce a water-resistant wallboard.

Dry lignocellulose is mixed with 3 to 6 per cent sulfur, and the mixture is

*Patent attorney, 17600 Pinehurst, Detroit 21

Other Patents of Interest to the Pulp and Paper Industry

Subject	Inventor	Patent No.	Date
Dispensing carton	Marathon Corp.	2,683,529	7/13/54
Bark-removing drum having welded hoop construction	Ingersoll-Rand Co.	2,684,092	7/20/54
Divisible carton	Fredrick A. Keeler	2,684,178	"
Carton	William P. Frankenstein	2,684,194	"
Laminated gummed tape	Atlantic Gummed Paper Corp.	2,684,316	"
Carton blank setting up mechanism	The Ohio Boxboard Co.	2,684,616	7/27/54
Paperboard shipping carton for individual articles such as scissors	The Hinde & Dauch Paper Co.	2,684,758	"
Package with integral handle	Container Corp. of America	2,684,759	"
Shipping and dispensing carton	John W. Kraus	2,684,792	"
Drier cylinder for papermaking machinery	J. M. Voith G.m.b.H.	2,685,139	8/3/54
Mulching paper for inhibiting weed growth	Crown Zellerbach Corp.	2,685,150	"
Method of screening fibrous suspensions	Svenska Cellulosa Aktiebolaget	2,685,235	"
Collapsible disposable container	William H. Crosby	2,685,399	"
Carton reclosure	General Motors Corp.	2,685,400	"
Cover for bottle carriers	Waldorf Paper Products Co.	2,685,401	"
Folding shoe box	Irving Caster	2,685,402	"
Shirt wrapper and collar support	Princess Ann Cartons, Inc.	2,685,403	"
Lignocellulose board	Arthur B. Anderson and Lyllian F. Lighthall	2,685,529	"
Mineral coated paper	S. D. Warren Co.	2,685,538 & 2,685,571	"

brought to a pressure of 100 to 1000 psi at a temperature of 180 to 300°C. for a period of 5 to 60 minutes.

The patent specification contains a number of examples and a considerable amount of experimental data.

Fiber-treating machine

U.S. 2,685,826, issued Aug. 10, 1954, to Andrew R. Black, describes a new construction for the treatment of fiber to be used in papermaking. The apparatus is shown in Fig. 3.

The tank A is filled to a nearly full condition with water, the surface of the water being a few inches below the top of the

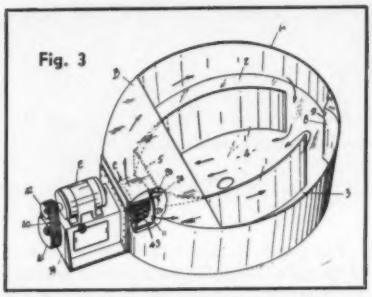
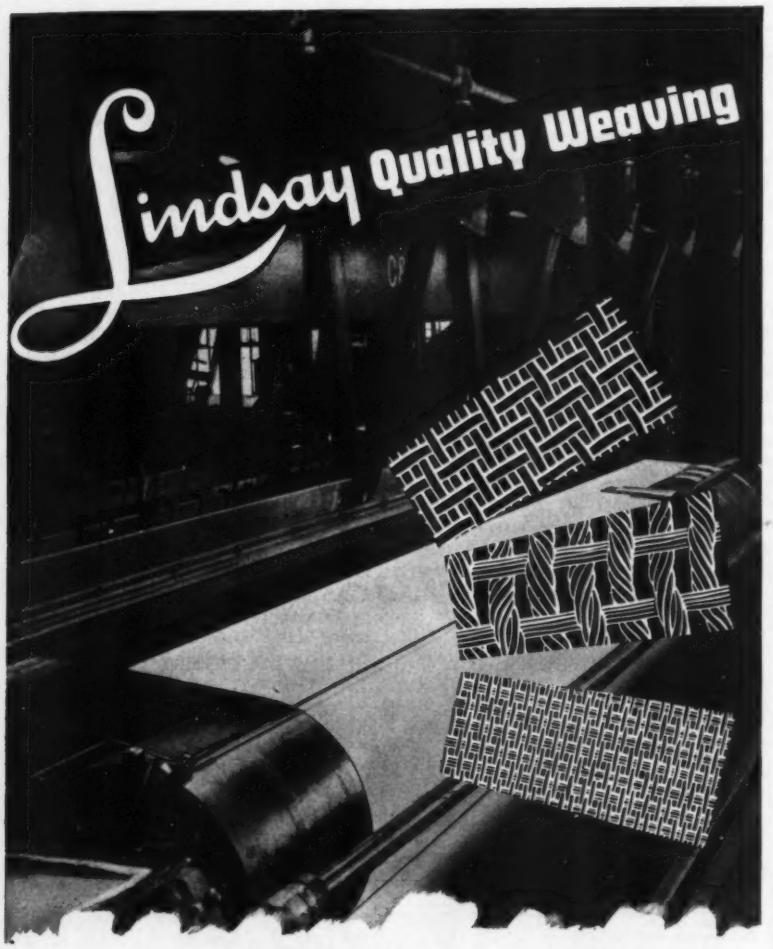


Fig. 3

tank. The paper stock is placed in the water in the tank, to be circulated from the tank through grinding and crushing means C and back to the tank for recirculation.



The flying shuttle symbolizes speed and production —but with minute observation of every square inch of Lindsay Fourdrinier wire cloth. Whether with Lindsay Longcrimp or any special weave, only uniform quality is tolerated. The Lindsay Wire Weaving Company, Cleveland 10, Ohio.

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Patent Reviews . . .

The rotor unit is started into operation by being driven from the motor E, the material in the form of sheets or laps being fed into the tank at a uniform rate. The propeller wheel is a part of the rotor, and causes the flow of the water carrying the material to be treated into the crushing and grinding unit at the left-hand end of the inflow channel 4. The material is first acted upon by the breaker arms 26 which are rotating at high velocity, and the action of the arms is to reduce the material to pieces small enough to pass through the propeller wheel at the spaces between the spokes of the latter, whereupon the material is carried into the space surrounded by the rotor blades 19 and fixed blades or bars. In this operation the propeller wheel acts virtually as a centrifugal pump, and when the material reaches the space within the rotor blades it is thrown by centrifugal force into the spaces between the rotating bars or blades which drive it at high velocity against the edges of the fixed bars or blades and break it up into still smaller pieces.

The material continues on into the outer channels 2 and 3 of the tank from which it is deflected by the opposite sides of the deflector 8 to enter the inflow channel 4 of the tank and continue on and back to the unit C again.

Sizing paper pulp

In U.S. 2,692,824, issued Oct. 26, 1954, to Clifford J. Yarber, and assigned to A. M. Meincke & Son Inc., a method of sizing paper pulp is described.

Resin is added to an aqueous suspension of paper pulp fibers in sufficient amount to produce a pH of about 9. The suspension is then brought to a pH of 5.2 to 6.5 by adding alum. From 1 to 5 per cent of a cold swelling starch containing an acid salt such as monosodium phosphate (in sufficient amount to produce a pH of 5.2 to 6.5 in the cold swelling starch) is added to the suspension of paper pulp, reducing the pH of the suspension to 4.5 to 5. The paper is then formed.

It is claimed that the paper gives lower ink penetration, is less fuzzy, and has a fold which is better than the same product treated with corn starch.

Head box for a fourdrinier machine

Two patents issued on Sept. 7, 1954, to Marathon Corp. relate to improvements in head boxes for fourdrinier machines. U.S. 2,688,276, by Robert E. Showers, describes the discharge nozzle in detail, while U.S. 2,688,277, by Jerome J. Luebke, describes the entire head box as a unit.

The principal object of the inventions is to provide a head box having an improved discharge portion by means of which a smooth stream of well-mixed stock will be delivered onto the forming surface of a foundrinier belt, so as to obtain formation of a sheet of paper of uniform thickness and good quality at high speed.

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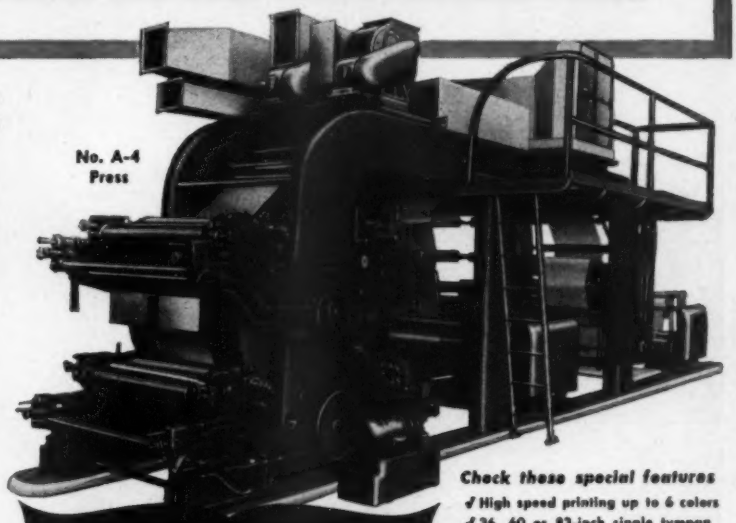

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In Fig. 4 (taken from U.S. 2,688,276), 10 designates a papermaking machine head box having a discharge throat or channel 11 terminating at a slice 12 with a slot-like orifice from which a flat stream of pulp stock flows onto the upper run of a fourdrinier wire belt 13, the belt being trained around the usual breast roll 14.

The head box is of the gravity flow type. It includes a vertical baffle wall 19 forming a delivery chamber 20 with the front walls and side walls, there being an up-pass 21 between the baffle wall and the lower front wall. The slice 12 consists of a top plate 36 spaced above a bottom plate 37. The slice plate 36 is hinged at its rear portion. The slot-like orifice may be about 3/8 in. high in the case of a tissue making machine. The front end of the slice plate 36 is vertically adjustable by a series of suspension rods 48 (one being shown).

The flow-smoothing and stock-mixing grid section 35 consists of a number of rows of parallel metal tubes, preferably of copper and of square cross-section, which are brazed or welded together in parallel relation to form a rigid assembly fitting in the discharge throat or channel 11. By way of example, these tubes may be about 1 in. square, and the throat may be about 6 in. deep. The grid section presents in cross-section a cellular or honeycomb appearance, and forms numerous parallel ducts all extending in the direction of the line of flow.

In operation of the machine the pulp stock is supplied to the head box delivery chamber 20 through the up-pass 21 and is maintained at a suitable level in this chamber in accordance with the speed of the fourdrinier belt, this level determining the spouting velocity at the slice. The stock flows downwardly and forwardly through the inclined discharge throat 11, and for a considerable distance passes through the numerous parallel ducts or channels formed by the tubes of the grid section 35, thus effectively breaking up

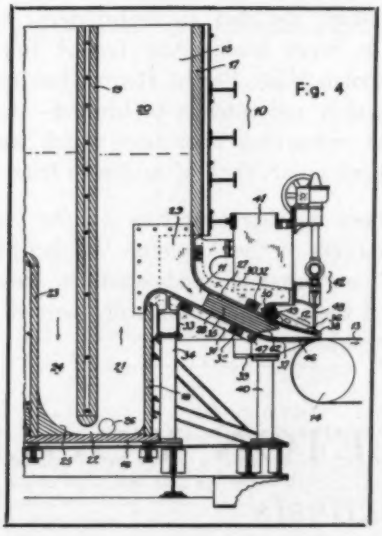


Fig. 4

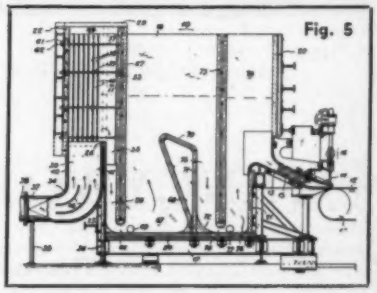
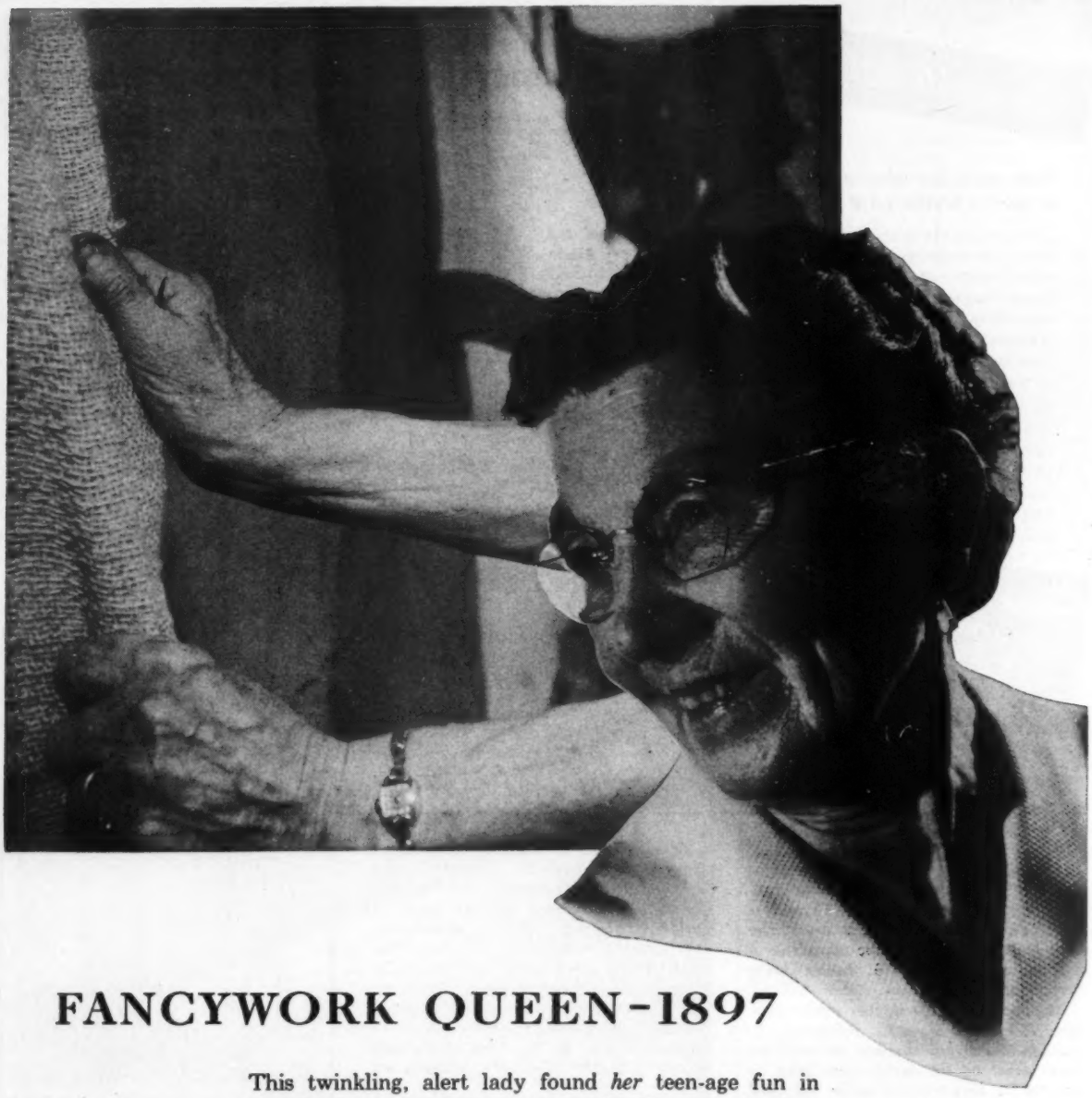


Fig. 5

any large vortices and straightening the flow so that the stock stream issuing from the slice will have a smooth glassy appearance, free of streakiness and cross currents, and the paper formed will be of uniform thickness and quality. In its passage through the grid section tubes, the stock, by its frictional contact with the extended surface of the tube walls, will be subjected to a mild mixing action which will have a beneficial effect on the texture of the paper. The construction of the grid section is such that it is self-cleaning, avoiding any lodging or clumping of the stock.

The construction of the invention enables a smooth, high-velocity flow of well-mixed stock to be delivered to the forming surface of a fourdrinier wire, so as to secure the formation of a strong sheet of paper of uniform thickness and good quality at higher operating speeds.

The assembled unit is shown in Fig. 5 (taken from U.S. 2,688,277.).



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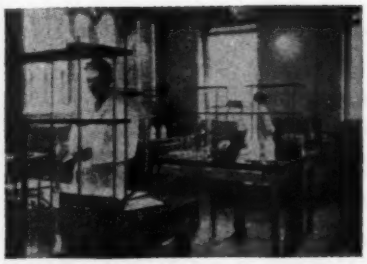
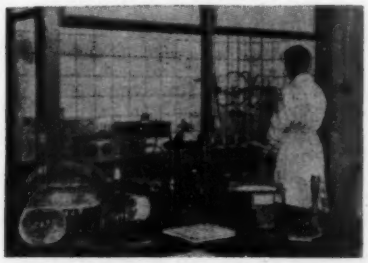
FOREIGN ABSTRACTS

Some of the laboratories of the Water Protection Committee: (left) physics laboratory; (center) chemical laboratory, and (right) bacteriological laboratory

Handling water pollution problems in Sweden

Despite the large land area and many lakes, rivers, and long shorelines in Sweden, pollution of natural waters is a serious problem. The disposal of industrial wastes in natural waters is prohibited by law, unless adequate treatment has been given to these wastes, or unless no such treatment can reasonably be expected. The Swedish pulp and paper industries have had a long fight against pollution.

At first, individual companies were left to their own devices in combatting the pollution problem, but, in 1937, an organization was set up for the paper industry alone; and, in 1945, a joint organization was formed for *all* Swedish wood-using industries. In 1954, increased support was given to this joint organization by various members of the industry; and, in this way, the Water Protection Committee of the Swedish Wood-using Industries has received an impetus permitting expanded research.

This Committee maintains a waste water laboratory, consisting of a technical division, a research division, and an analytical department. The function of the laboratory is to carry out research work concerned with the composition of industrial wastes, the possibility of rendering polluting substances harmless, the recovery of technically valuable products, studies on the effects of industrial wastes on natural waters, and improved methods in analyzing waters for materials causing pollution. Some of the committee's laboratories are shown in Figs. 1, 2, and 3. Besides these aims, the laboratory serves individual companies by making stream or mill surveys and by functioning in an advisory capacity as well.

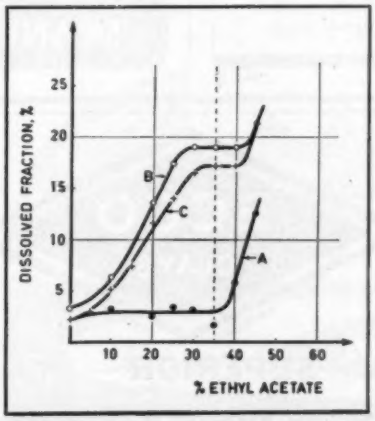
The committee also issues a bulletin in which its results and the results of its laboratories are published. Furthermore, the committee arranges a yearly symposium on industrial water pollution and on water treatment, which includes discussions and lectures. Stig O. Pehrson, *Svensk Papperstidn.*, 57, 839-43 (1954) (original in Swedish, with English summary).

Separation of nitrated hemicelluloses from wood pulps

In this study, the authors attempt to separate the hemicelluloses from cellulose in bleached pulps and in ramie by first nitrating the fibrous materials and then extracting with suitable solvent mixtures. The following are used: two sulfite pulps made from spruce, a spruce kraft, a commercial pine kraft pulp, a straw pulp and ramie.

The nitrations are carried out in phosphoric acid containing P_2O_5 at low temperatures. In all cases, the mixed nitrates are treated with mixtures of ethyl alcohol and ethyl acetate, with gradually increasing amounts of ethyl acetate. When about 35 per cent (by volume) ethyl acetate has been reached, the solubility curves of the two sulfite pulps show a distinct plateau (cf. accompanying figure), and this levelling out persists to about 50 per cent ethyl acetate. Such levels are far less pronounced in the case of the straw and the kraft pulps.

Using larger nitrated samples and the same solvent mixture (with 35 per cent ethyl acetate), the pulps are all separated into readily soluble fractions and insoluble fractions. These are carefully denitrated with ammonium sulfide in alcohol and separately hydrolyzed. The resulting sugars are then determined. In the insoluble fractions from the ramie and the sulfite pulps, the sugars recovered are 99-100 per cent



Extraction curves for nitrated ramie (A), sulfite high yield (B), and sulfite paper (C) pulps, extracted amount vs. ethyl acetate concentration

glucose; in one sulfite pulp about 1 per cent xylose is also detected. Mannose is absent. Insoluble fractions from the kraft pulps contain 6-8 per cent xylose and presumably less than 1 per cent mannose. Insoluble fractions from the straw pulp retain 28 per cent xylose and a trace of arabinose.

Calculated on the original wood basis, insoluble fractions from the spruce sulfite pulps are about 42 per cent and may be the "resistant cellulose" previously described by Giertz. The new data seem to support the assumption that wood contains a well-defined resistant cellulose framework. Elizabeth Dymling, Hans Giertz and B. Ranby, *Svensk Papperstidn.*, 58, 10-15 (1955) (in English).

Effects of the "shake" on sheet formation

These effects are studied, using the experimental paper machine of the Central Laboratory of the Swedish Paper Mills. The following factors are varied: frequency of the shake, amplitude, wire speed, and rate of drainage. The pulp used in these experiments is an unbleached sulfite, beaten

to 30° or 40° Schopper-Riegler. The basis weight of the sheet is 50 g. per sq. m.

The results are shown in a series of graphs and three half-tones. Up to wire speeds of 650 fpm, the shake can be used in producing definite changes in the strength anisotropy of the sheet, which is correlated with the orientation of the fibers. Optimum sheet formation (as indicated by minimum cloudiness) is reached at a specific setting of the shake parameters. Eleven figures and 8 references are given. A. J. Bergstrom, O. Brauns, and A. Svenson, *Svensk Papperstidn.*, 57, 693-701 (1954) (original in Swedish, with brief English and German summaries).

Method for determination of titanium oxide in paper

The author points out certain disadvantages in the TAPPI procedure for determining TiO_2 and suggests that a modification of Rahm's method (*Anal. Chem.*, 24, 1832 [1952]) be used.

One gram of paper is ashed, and the ash is treated with 10 cc. concentrated sulfuric acid and 30 g. potassium bisulfate. The mixture is heated and after cooling is further treated with 150 cc. water, 20 cc. concentrated sulfuric acid and 30 cc. concentrated hydrochloric acid. This, with adequate warmings, should insure the solution of all titanium salts. Then 0.5 to 1.0 g. finely divided aluminum is added, and the mixture is heated until the aluminum has also dissolved *completely*. This requires 0.5 to 1.5 hours. The reduced titanium salt is then titrated by means of a standardized ferric ammonium alum solution (in place of the ferric chloride suggested by Rahm). The results are quite accurate and are not affected by other common loading materials. Heinz Fiedler, *Wochbl. Papierfabr.*, 82, 960-3 (1954) (in German).

Titration of free rosin in rosin sizes

The author gives a critical evaluation of the methods now used in defining and determining "free rosin." The original rosin contains three types of components: the free resin acids nonacidic related compounds, such as the esters and anhydrides of these acids, and the unsaponifiables. In the formation of sizes, frequently nonacidic related compounds remain largely unsaponified; and the so-called *free rosin* contains not only the remaining parts of free resin acids (which are not in the form of soaps), but much of the original nonacidic related compounds, and unsaponifiables. Thus, the free rosin in a size is far more than residual free acids; and, so, the acid number of the free rosin, instead of being about 185.5, must take into consideration the other components, nonacidic related compounds and unsaponifiables, which often reduce this acid number to about 100-110.

The author points out some of the errors in the present-day determination and proposes the following titrimetric procedure. About 4-6 g. of a size solution are triturated with a small amount of alcohol (carefully neutralized); and when lumps have been broken up, 50-100 cc. of neutral alcohol are added. The solution is then titrated with a suitable standardized KOH solution using thymolphthalein as indicator. The results are reproducible within the above limits of sampling.

The TAPPI method's shortcomings are discussed. F. Blechinger, *Wochbl. Papierfabr.*, 23, 947-9 (1954) (in German).

Semichemical pulping of Australian hardwoods

Various species of Eucalyptus and another wood *(Angophora costata)*, in admixture, give a very satisfactory semichemical pulp when cooked with calcium hydroxide at a pressure of 95 psi. The method is cheap and requires no recovery system. The yields are in the range of 65-70 per cent, and the burst and breaking length are identical with those found in the case of semichemical kraft pulp made from run-of-the-mill chips. However, the lime-cooked pulps show a 10 per cent lower tearing strength, 40 per cent less rigidity, and 30 per cent greater stretch.

The effluents could be run on farm land. It is suggested that some of the lime-produced pulp could be used to replace chipstock in board furnishes without causing loss of strength.

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Foreign Abstracts . . .

When high strength is to be developed in the lime semichemical pulps, problems of special fiberizing and processing have to be met. The true nature of the action of slacked lime on the wood in the digestion has not been explained. B. A. Boas, *Australian Pulp & Paper Ind. Tech. Assoc. Proc.*, 7, 195-208; discussion, 208-212 (1953). *(See review of this book on page 91).*

Poplar for groundwood and chemical pulps

The author refers to researches by Brecht (at Darmstadt) and the U. S. Forest Products Laboratory and then to his own experience with mechanical pulps made from poplar. Such pulp dewaters more readily than does spruce groundwood but has lower strength properties, especially folding endurance. The poplar pulp is softer, bulkier, and more absorptive, and its sheets are more permeable to air; its color is also somewhat darker than that of spruce groundwood, but this is not significant.

Mill runs have shown that by replacing 40 per cent of spruce groundwood with bleached poplar groundwood, bulkier papers are obtained that serve well for medium-fine book, writing, and printing papers which are not inferior to those made from spruce mechanical pulps. However, this mixture of pulps is not recommended for use on high-speed newsprint machines.

In Germany, in 1953, beechwood accounted for over 34 per cent of the entire German chemical pulp production, namely about 186,000 metric tons. On the other hand, only 6,500 metric tons of poplar chemical pulp was made; the latter, when added in amounts ranging from 20-30 per cent, gave papers which printed well and did not curl.

Any tendencies toward dusting may be overcome by adequate beating and by the use of starch etc., in the beater. Comparative beating experiments with chemical pulps from spruce, poplar and beech show that spruce develops the highest tear resistance, with poplar pulp giving better results than those of beech. Spruce pulp also shows the highest folding endurance.

In the author's mill, recently, a special-purpose, halftone printing paper contained as furnish 70 per cent bleached poplar and 30 per cent bleached spruce sulfite pulps. The strength properties of these sheets were very nearly equal to those of the standard furnish, which consisted of 30 per cent bleached beech and 70 per cent bleached spruce sulfite. This example indicates that in certain instances the percentage of poplar pulp in furnishes can be increased, and the economic significance of this fact is discussed. Six tables and 4 references are given. Georg Wunschmann, *Das Papier*, 8, 457-62 (1954) (through *Bull. Inst. Paper Chem.*, 25, 311-12 [1954]) (original in German, with English and French summaries).

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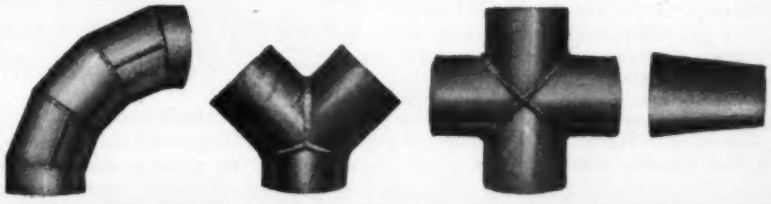

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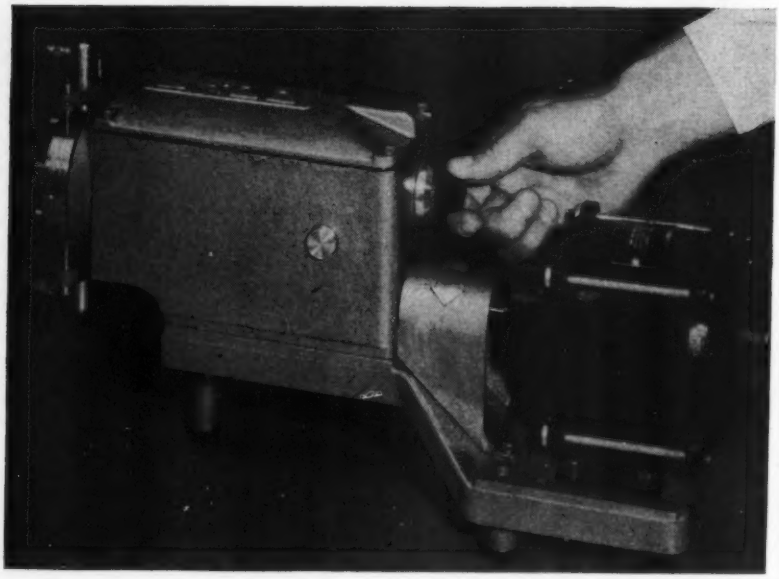
NEW PRODUCTS



Piston-diaphragm pump

Precision pumping, metering, feeding and proportioning of fluids at micro flow rates is achieved with the new "Microflo" Pulsafeeder pump, according to the manufacturer. This new piston-diaphragm pump will operate against pressures up to 1000 psig and has a maximum flow rate of 2400 ml. per hour.

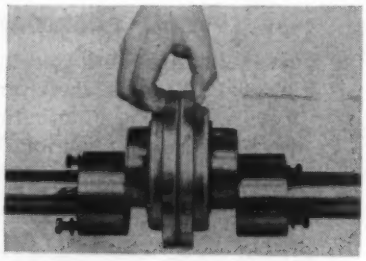
There is no stuffing box, packing or running seal to come in contact with the liquid being pumped. The product is isolated from all pumping parts by a hydraulically balanced diaphragm.

The design of the pump is such that a standard 1/20 hp electric motor without gear reduction or other special features can be used. Pumping rate, established by the length of the piston stroke, is handset on a dial indicator calibrated in 1000 increments. This setting can be manually adjusted in infinite increments while the pump is idle or operating and has a range from 0 to 100 per cent capacity. *Lapp Insulator Co. Process Equipment Div., 7 Gilbert St., Inc., LeRoy, N. Y.*

Heavy-duty bin level control

An improved type heavy-duty "Tellevel" bin level control is now on the market. Major changes involve a redesign of switch housing and deflector mechanism to further reduce any possibility of sticky material building up on the unit. The pendant steel cone deflector has been replaced by a steel pyramid. The switch housing is now a one-piece unit of spun steel tapped at one end for electrical conduit and sealed at the other end by a molded rubber grommet. Other design features remain unchanged.

Standard-duty and explosion-proof "Tellevels" are available for lighter service with small lump, granular, and powdered materials. *Stephens-Adamson Mfg. Co., Aurora, Ill.*



Spacer-type shaft coupling

Of interest to operating and maintenance engineers is the practical design of the new Type F "Steelflex" spacer coupling which makes it ideal for use between motors and pumps, where a gap between shafts must be provided to permit removal of pump impeller shaft assemblies, or on any application where a large gap (up to 12 in.) cannot be avoided.

Over and above the protection which the "Steelflex" design offers against damage from impact loads and shaft misalignment, this spacer-type coupling affords easy connection and disconnection of shafts without disassembling the coupling, according to the manufacturer.

Because the coupling is prelubricated at the factory, maintenance lubrication, it is claimed, requires only the addition of lubricant by means of a grease gun once every six months. *Falk Corp., Dept. 361, 3001 W. Canal St., Milwaukee 8, Wis.*

Rotating roll clamp

A new 90° rotating roll clamp capable of high-tiering rolls from 36 to 60 in, in diameter and weighing 6,000 lb. has been announced. With optional provisions, it can handle rolls from 12 to 36 in. in diameter. When mounted on the "Utilitruc-100" model fork truck, the clamp tiers 6,000-lb. rolls four high. It can be mounted on smaller capacity fork trucks for handling lighter rolls. Design of the device permits easy entrance and exit from railroad cars.

The clamp, which weighs 2,240 lb., is hydraulically operated. Two clamping cylinders exert a total clamping pressure of over 12,000 lb. A single cylinder which develops a torque of 106,000 in.-lb. is used for rotation. Cylinders are located for ready access and can be serviced in a matter of minutes, according to the manufacturer. All piston rods are chrome plated to protect against rust and foreign elements.

The lower clamp arm is fixed to allow rolls to be picked up from the floor, and it is protected with removable wear shoes. The upper arm is pivoted on a piano hinge. *Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.*

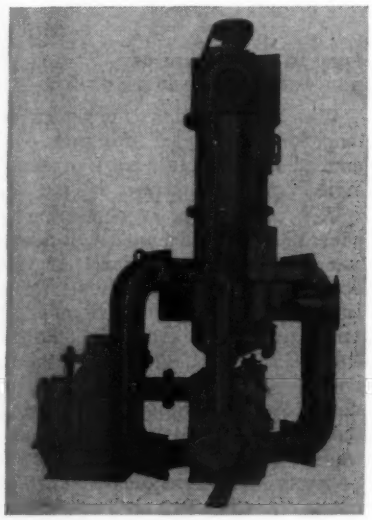
High-capacity chlorinator

An improved high-capacity solution feed-type chlorinator with a corrosion-proof polymer-impregnated fiber glass cabinet that does not require painting has been developed. Use of the diaphragm regulator principle permits a safe, reliable, mechanically-enclosed chlorinating machine, according to the manufacturer.

Manual adjustment of chlorine gas injection is made by the rate valve on the front of the cabinet, and the actual flow rate is observed through the glass flow meter. Six metering tube and float combinations, interchangeable from the front of the cabinet, provide 10 to 1 or greater overlapping flow ranges from a minimum of 100 lb. per day to a maximum of 8,000 lb. per day of chlorine gas.

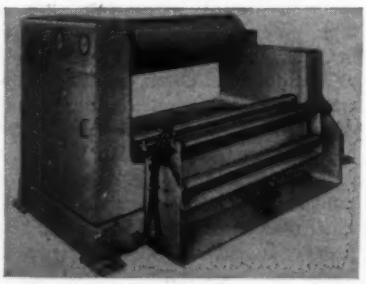
In addition to manual chlorine flow rate adjustment, the chlorinator is available with the following automatic functions:

automatic proportioning by a transmitted pneumatic signal from an orifice, venturi, or variable-area flow meter; automatic proportioning by mechanical connection to a float in a flume, weir or tank; remote pneumatic set; program controlled operation—single, or multiple cam-operated; timer sequence control; automatic pump sequence control, and automatic start-stop control. *Fischer & Porter Co., 296 Jacksonville Rd., Hatboro, Pa.*



Pulverizer

An improvement in the design of Majac Jet pulverizing machines has been announced. The new design incorporates a "rock stripper" phase which removes foreign particles of great specific gravity immediately after material to be pulverized is introduced into the machine. By eliminating this foreign material quickly, the entire pulverizing process is accelerated. *Majac, Inc., 23rd St. at P.R.R., Sharpsburg, Pa.*



Backstand

A new backstand, which is now on the market, controls both tension and edge position of a moving web as it is fed to a rewinder, slitter, converting machine, printing press or other similar device requiring such control. Tension may be maintained at any selected value up to 4 lb./in. within 5 per cent at any steady web speed. Edge position is maintained within .015 in., with a runout of ± 3 in. from center position.

The backstand operates at speeds up to 1200 fpm, and the larger model will ac-

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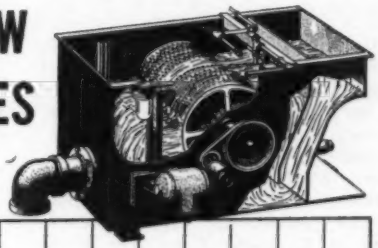
ASKANIA CONSISTENCY REGULATOR

FOR AUTOMATIC CONTROL OF SULPHATE AND SULPHITE STOCK AT LOW CONSISTENCIES



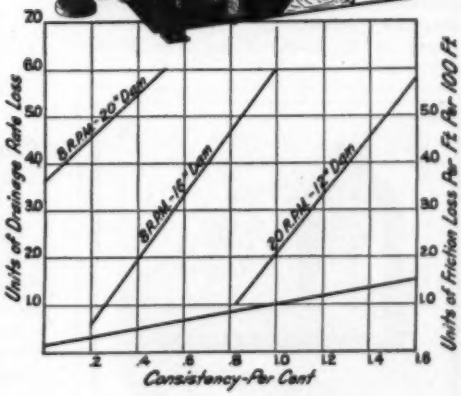

Units of Drainage Rate Loss
Units of Friction Loss Per Ft Per 100 Ft
8 R.P.M.-20° Open
8 R.P.M.-16° Open
20 R.P.M.-12° Open
Consistency-Per Cent

Chart illustrates Drainage Rate Principle—only accurate measure of consistency in thin stock range below 1.5% available. Rate change of friction loss (black line) is low ...rate change of head (gray line) is high for same consistency change.

With the Askania Consistency Regulator, consistency can easily be changed to give the optimum for each screen or decker. Differences in digester cookers and washings can be compensated over wide ranges. Operation of screen or decker at maximum rating is assured—no need to set flow below capacity to eliminate flooding.

The consistency recorder gives a minute to minute record as well as a complete record of each 24-hour period. Only 75 gallons per minute pass through regulating system ... sample is used to control main supply line. The Askania consistency regulator can easily be added to present equipment, is self-cleaning and operates at low cost. *Write for bulletin 145.*

ASKANIA REGULATOR COMPANY
278 E. Ontario Street, Chicago 11, Illinois
Subsidiary of General Precision Equipment Corp.

New Products . . . . . .

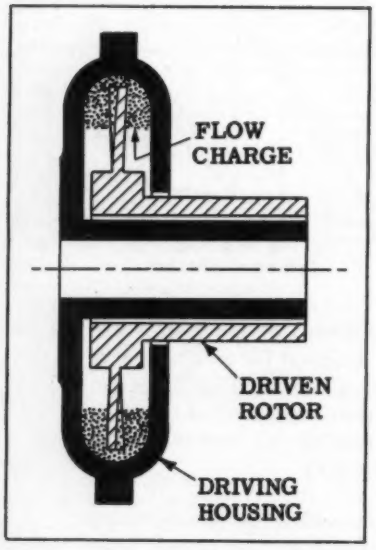
commodate a 2,000-lb. roll measuring 54 in. in width and 48 in. in diameter. According to the manufacturer, accurate control is maintained down to a 3-in. core.

The tension control system is fully hydraulic. Use of incompressible fluid to transmit signals cuts response time to one-fourth that of an otherwise comparable pneumatic/hydraulic control system. The unwind stand and the control systems are combined in an integral package requiring only electrical and air connections for operation. The larger units may require water to cool the brake.

The control panel may be installed remotely for the operator's convenience. The tension gauge may be calibrated to read in pounds per inch if only one web width is to be handled, or in total pounds of tension force. *Askania Regulator Co., 240 E. Ontario St., Chicago 11, Ill.*

Dustless fortified rosin size

"Cyfor" fortified rosin size is now available in a new dustless form. The new anti-dusting process is being applied to all dry grades of "Cyfor." The new dustless property is expected to result in more satisfactory handling in the paper mill. *American Cyanamid Co., Paper Chemicals Dept., 30 Rockefeller Plaza, New York 20, N. Y.*



Dry fluid drive

A new development in industrial power transmission, called "Flexidyne," is described as a dry fluid drive. Based upon a completely new principle, "Flexidyne" handles difficult starting and reversing problems and gives a new kind of protection against shock and overloads, according to the manufacturer. Its major advantages over any other fluid-type drive are based on the fact that at normal operating speeds it does not slip. At the same time, in the case of an overload, it is slippage which gives protection.

Originated in Europe, where thousands of installations have already been made, the new drive has been redesigned to American standards. It is claimed to have wide application for industrial drives involving heavy inertia and shock loads on such equipment as compressors, centrifuges, conveyors, crushers, and various heavy machines.

The drive is made up of a housing, inside which a rotor is free to turn concentrically. Between the two are fine particles of spherical steel shot, called the "flow charge," which act very much like a fluid. It is the flow charge which transmits power from the housing to the rotor. This flow charge is easy to seal in, has a high density, and can stand relatively high temperatures.

The amount of the flow charge determines the torque capacity. Because it is easy to vary the amount of this charge, this new drive will give the exact starting torque needed for anything from the smoothest to the fastest start.

According to the manufacturer, accurate overload protection is assured as the "Flexidyne" can be set to slip at anywhere from as low as a gentle 20 per cent over full load torque to as high as peak motor torque. During starting and overload periods the current draw is at a minimum because with the standard "Flexidyne" setting the motor is never pulled down to less than 90 per cent of synchronous speed. *Dodge Mfg. Corp., Mishawaka, Ind.*

Paper Mill Power Supply

(Continued from page 60)

This yields an over-all heat rate of 3600 BTU per kilowatt hour, as compared to 9200 in that of the best central stations and to the theoretical heat equivalent of 3412 BTU per KWH.

No central station or super-pressure system can compete with a mill utilizing its exhaust steam at any pressure.

In large pulp and paper mills, power can be generated at between 2 to 5 mills per kilowatt-hour, including interest, insurance, taxes and depreciation charges. These costs vary for different plants and depend on the cost of fuel and labor, the ratio of steam to power required, the plant load factor, the type of design, and the method of operation.

When to make power

It also usually pays to make power when the lower pressure process steam requirements are relatively large in comparison to the power load. The fuel cost of power can be almost halved if one-half of the turbine exhaust can be utilized to replace direct boiler steam. High efficiency can be maintained by using a bleeder type turbine-generator equipped with a condenser.

Finally, it may be economical to generate power where a supply of cheap fuel is available. This includes bark, sawdust or black liquor from an in-plant source, or inexpensive fuels like coke breeze, anthracite fines or bituminous middlings, which are available in certain areas.

Proper evaluation of power requirements needed

With a proper analysis of the entire range of possibilities, the most economical solution can always be determined before any capital is invested.

The difficulties encountered by paper mills burdened with high power cost can usually be traced to low boiler pressure in the initial installation. The power demands cannot be completely made from the process steam, and the balance must be made up by purchasing or by generating the remainder through condensing turbines. In the case of several plants studied by this writer, high topping pressures were necessary in order to obtain an efficient heat balance and make maximum use of existing low pressure boilers and generators.

The first step in a proper evaluation is a careful survey of steam and power actually required for space heating and the various processes. Often, a slight change in operating techniques and procedures can result in a substantial improvement in the final balance, and in reduced fuel costs.

The more obvious areas of steam waste include over-heated working space, by-passed steam traps, use of high pressure steam for heating, uninsulated steam lines and the wasting of flash steam. Often, a careful operation study can reduce the heating demand to a point where a boiler can be taken off the firing line.

Improvements in the conditions of purchased power may sometimes shift a decision in its favor. A survey may uncover a method of reducing peak loads, of rescheduling heavy motor starts to level the KW curve, of correcting low power factor or of taking advantage of off-peak power rates.

In each particular mill, several programs of action usually develop as being both feasible and economical. The plan of lowest capital expenditure which will meet present and proposed demands is the base. Other programs indicating more economical and efficient operation should be carefully studied and compared as to capital and operating costs.

NEW LITERATURE

Books

PRINCIPLES OF MANAGEMENT—An Analysis of Managerial Functions. By Harold Koontz and Cyril O'Donnell. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 6¼ x 9¼. 664 pages. $6.50.

The purpose of this book is to provide a conceptual framework for the orderly presentation of the principles of management. A wealth of information gained from the discoveries, formulations, and researches of the many managers and scholars who have studied the problem is presented.

For the many whose primary interest is in business management, the majority of case examples cited in this book deal with problems of the business enterprise. In concentrating their attention on this field of management, however, the authors do not overlook the fact that the same principles are applicable elsewhere.

The first five chapters cover the basis of management. The remaining 25 chapters of this volume deal with the following managerial functions: organization, staffing, direction, planning, and control. Selected references are listed at the end of each chapter.

PARTIAL CUTTINGS IN NORTHERN HARDWOODS OF THE LAKE STATES—Twenty-Year Experimental Results (Technical Bulletin No. 1076). By F. H. Eyre and W. M. Zillgitt. Published by U. S. Department of Agriculture, Washington, D. C. (Order from Superintendent of Documents, Washington, D. C.). 6 x 9¼. 124 pages. Paperbound. 40 cents.

This bulletin is based on 20-year records available from a series of experimental cuts made on the Upper Peninsula Experimental Forest near Marquette, Mich. Results of these experiments are supplemented by information from various places in the Lake States.

The northern hardwood forest is described, showing its extent and composition, the kinds of soils and sites upon which these trees grow, various causes of injury to the forest, and the relative value of the species which compose it. Information is presented as to the growth and mortality under different kinds of cutting, how often and how heavy cuttings should be made, how to obtain natural regeneration of the forest and what methods of slash disposal and fire protection are best.

Because second-growth forests are becoming of increasing importance with the progressive removal of the old-growth stands, attention is also devoted to treatment of second-growth stands.

PACKAGING ENGINEERING. By Louis C. Barail. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 6¼ x 9¼. 410 pages. $9.50.

A description of all packaging materials, their best uses, and the methods employed by packaging engineers to obtain the most efficient results at the lowest possible cost is given in this new book.

Over 150 photographs, drawings and tables illustrate information on types of containers, machinery, package design, protection against deterioration, labeling, testing and all other design and engineering aspects. Each chapter presents new developments of importance in the fields of packaging and packing, and the most recent materials and methods are described in a separate chapter, which concludes the book.

A special chapter on the requirements for packaged goods sold to the armed forces is included. Another chapter gives complete information on packaging for export to various countries and includes a glossary in French and Spanish. Of special interest to the paper, paperboard and paper converting industries are the chapters on fiberboard containers and paper bags, and paper and plastic food containers.

AUSTRALIAN PULP AND PAPER INDUSTRY TECHNICAL ASSOCIATION PROCEEDINGS, 1953. Vol. 7. Published by the Australian Pulp and Paper Industry Technical Association, 476 Collins St., Melbourne, C.1, Victoria, Australia. 5¾ x 8¾. 400 pages.

This volume comprises the proceedings of the General Conference of APPITA, held April 27 to May 1, 1953 in Sydney, Australia.

Beginning with J. D. Andrews' presidential address, the book goes on to discuss the paper industry in the Australian economy. Some of the titles of papers presented at this conference are as follows: "Calender Operation," "Variables in the Formation of Handsheets," "The Manufacture and Utilization of Alkali Lignin," "Semichemical Pulping of Hardwoods with Lime," "Testing of Wood Pulp for Moisture," "Improving the Performance of M.I.T. Fold Testers," "The Preparation of Papermaking Clay," and "Statistical Control of Papertesting Instruments." Included with the papers are tables, diagrams, graphs, photographs, a bibliography, summary and discussion.

A list of officers and committees for 1953-54, a register of members as of January, 1954, and a register and directory of company and sustaining members are given.

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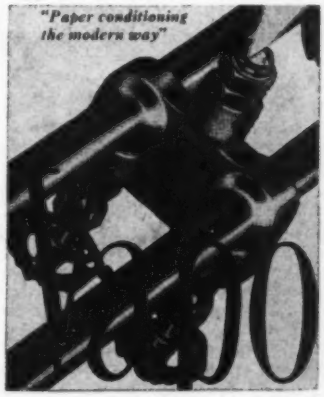

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New Literature . . .

Booklets and Pamphlets

1955 DIRECTORY OF OCCUPATIONAL SAFETY POSTERS. Published by the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill. 8¼ x 11¼. 72 pages. 50 cents. This directory contains 744 miniature posters designed for use in various industries. Sections on how to obtain posters and how to use them are included.

PROFITS FROM CAR POOLING FOR PAPER MERCHANTS. Published by the Wisconsin Paper Group, Neenah, Wis. This booklet gives the history and aims of the Wisconsin Paper Group since its founding over 20 years ago. It shows paper merchants how they can reduce their shipping costs through the use of Wisconsin Paper Group pool cars. It also contains complete classified listings of all the papers and paper products (over 350 grades) produced by the member companies.

QUALITY CONTROL AND RESEARCH. Published by Scientific Apparatus Makers Association, 20 N. Wacker Dr., Chicago 6, Ill. 6 x 9. 24 pages. 25 cents. Beginning with detailed definitions of laboratory quality control and research, the booklet goes on to discuss the cost of laboratory quality control. The steps taken in setting up a quality control laboratory are described. Several examples are cited showing how the research point of view has insured the products of various industries.

STAINLESS STEEL VALVES AND FITTINGS IN THE PULP AND PAPER INDUSTRY. By Percy C. Shaffer. Reprinted by Cooper Alloy Corp., Hillside 5, N. J. 8½ x 11. 8 pages. This article reprint from *Pulp and Paper Magazine of Canada* magazine is designed to clarify procedures for specifying stainless steel valves and fittings in the pulp and paper industry. In addition to discussions on applications, processes, methods of installation and maintenance, the booklet includes diagrammatic illustrations and tables on mechanical properties, physical properties and corrosion resistance.

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Manufacturers' Publications

Through the co-operation of manufacturers and suppliers, THE PAPER INDUSTRY *lists the following catalogues, bulletins and booklets. They may be obtained without cost or obligation, unless otherwise specified, by writing direct to the manufacturers. Please address requests on your company letterhead.*

Floor Maintenance. Tremco Mfg. Co., Dept. PI, 8701 Kinsman Rd., Cleveland, Ohio—This illustrated brochure, titled "Floors and Floor Problems," thoroughly explores such subjects as the various types of floors, how they are built, what factors enter into their deterioration, and how floor troubles can be diagnosed and treated.

Knife & Face Grinders. Samuel C. Rogers & Co., Dept. PI, 183-205 Dutton Ave., Buffalo 11, N. Y.—Specifications, features and illustrations of the Series 220 extra-heavy-duty knife and face grinders are contained in Bulletin 220.

Dryers, Frames, & Rope Carriers. Downingtown Mfg. Co., Dept. PI, Downingtown, Pa.—Bulletin No. 1150A, entitled "Downingtown Dryers, Frames and Rope Carriers," is now available in a revised printing. Descriptions and illustrations of dryer equipment are included, and the cement bonded sand core method of dryer casting is explained.

Circulating & Coolant Pumps. Ingersoll-Rand Co., Dept. PI, 11 Broadway, New York 4, N. Y.—This new publication, Form 7074-D, shows the entire line of Class KRV and KRVS motorpumps as set up with totally enclosed motors. Performance curves, cross-sections, dimensions, descriptive material, etc., for each particular class of pump are included.

Valve Operators. Philadelphia Gear Works, Dept. PI, Erie Ave. and G St., Philadelphia 34, Pa.—Catalogue L-54 describes "LimiTorque" valve operators. It illustrates and describes the latest "LimiTorque" SMA valve control for large or small valves, as well as showing operational details and illustrations.

Shaft Mounted Drives. Falk Corp., Dept. PI, 3001 W. Canal St., Milwaukee, Wis.—Designated as No. 7101, this 8-page bulletin on all-steel shaft mounted drives contains design data, selection tables, dimensions, weights, and installation photographs.

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Paper and Pulp Map of the United States

Size 42" x 58" (Issued as a supplement to the December, 1953 issue of The PAPER INDUSTRY)

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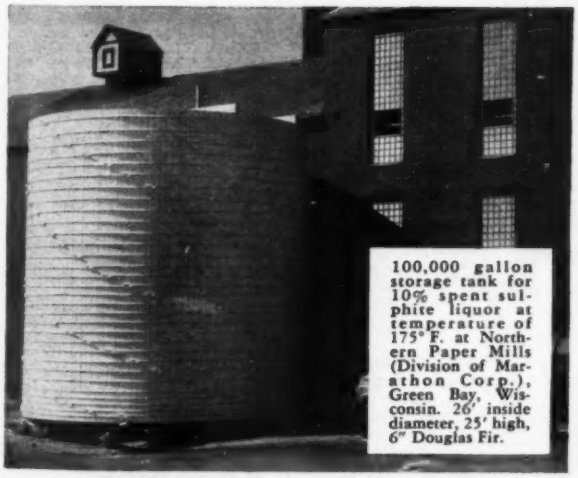

100,000 gallon storage tank for 10% spent sulphite liquor at temperature of 175° F. at Northern Paper Mills (Division of Marathon Corp.), Green Bay, Wisconsin. 26' inside diameter, 25' high, 6" Douglas Fir.

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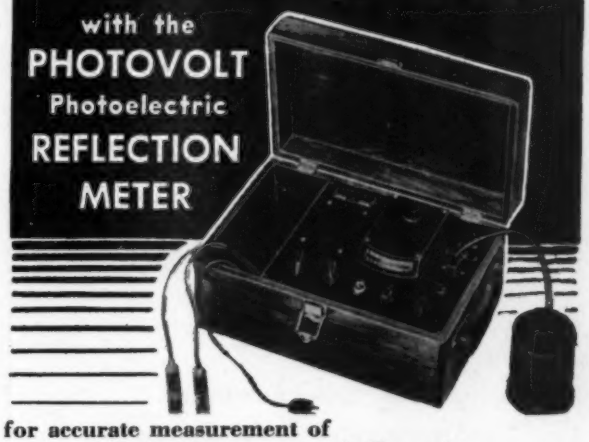

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Brightness and Opacity

of pulp and paper in terms of TAPPI specifications.

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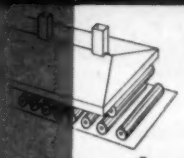

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that cut cost and increase production in

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0.5% on dry fibre weight — effective all types of furnish.

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MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

The following are quotations to mills, f.o.b. New York:

	per cwt.
No. 1 White Shirt Cuttings	14.50 to 15.00
New Unbleached Muslins	16.50 to 17.00
Fancy Shirt Cuttings	7.50 to 8.00
No. 1 Percales	7.00 to 7.50
No. 1 Washables	3.00 to 3.25
No. 1 Light Silesias	8.00 to 8.50
No. 1 Light Prints	6.00 to 6.25
Light Flannelettes	8.00 to 8.50
Cottonades	3.75 to 4.00
Blue Overalls	8.00 to 8.50
Blue Cheviots	7.75 to 8.25
Canton Flannels, Bleached	11.50 to 12.00
Canton Flannels, Unbleached	11.50 to 12.00
Osnaburg Cuttings	10.00 to 10.50
Underwear Cuttings, Bleached	16.00 to 16.50
Underwear Cuttings, Unbleached	16.00 to 16.50
Khaki Cuttings—	
Sun Tan	6.75 to 7.00
Mixed	3.75 to 4.00
Linen Cuttings—	
American	7.50 to 8.00
White	13.00 to 14.00
Gray	13.00 to 14.00

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.
Roofing	
No. 1	1.25 to 1.35
No. 2	.95 to 1.00
No. 3 and 4	.70 to .80
Twos and Blues—	
Repacked	2.25 to 2.50
Thirds and Blues—	
Repacked	2.00 to 2.25
Miscellaneous	1.65 to 1.85
Whites, No. 1—	
Repacked	3.75 to 4.00
Miscellaneous	3.25 to 3.50
White, No. 2—	
Repacked	2.75 to 3.00
Miscellaneous	2.25 to 2.50

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shoppers	

ROPE and BAGGING

f.o.b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	5.50 to 6.00
Domestic	5.50 to 6.00
Wool Tares—	
Light	5.50 to 6.00
Heavy	5.75 to 6.25
No. 1 Scrap Bagging	4.50 to 5.00
Manila Rope—	
No. 1 large	5.25 to 5.50
No. 1 small	4.25 to 4.50
Sisal Rope—	
No. 1 large	4.75 to 5.00
No. 1 small	4.25 to 4.50
New Burlap Cuttings	5.75 to 6.25
Jute Threads—	
Foreign (Nom.)	6.00 to 6.25
Domestic	6.25 to 6.50
Strings—	
No. 1 sisal	4.75 to 5.00
No. 2 sisal	4.25 to 4.50
Soft jute	4.75 to 5.00
Mixed	2.50 to 2.75

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

	per ton
Shavings—	
Hard White Env. Cuts.	120.00 to 130.00
Hard White No. 1	100.00 to 105.00
Soft White, one-cut	75.00 to 80.00
Soft White, No. 1	60.00 to 65.00
Coated Soft	40.00 to 45.00
Fly Leaf No. 1	25.00 to 30.00
Fly Leaf, Woody No. 1	25.00 to 30.00
No. 2 Mixed Col. Woody	20.00 to 25.00
Flat Stock—	
No. 1 Heavy Books and Magazines, Repacked	22.00 to 24.00
Mixed Books	16.00 to 17.00
Ledger Stock—	
No. 1 White	55.00 to 60.00
No. 1 Mixed (Colored)	35.00 to 45.00
Manilas—	
New Env. Cuttings	70.00 to 75.00
New Cuts, One-Cut—	
Extra Manilas	19.00 to 20.00
Manila Tab Cards, Free of Ground Wood	85.00 to 90.00
Colored Tab Cards	60.00 to 65.00
Kraft—	
New Envelope Cuttings	65.00 to 70.00
Tripled Sorted No. 1 100%	40.00 to 45.00
No. 1 Old Assorted	27.50 to 32.50
News—	
White Blank	65.00 to 70.00
Overissue	26.00—
No. 1 Folded	20.00—
Old Corrugated Containers	22.00—
New Jute Currugated Cuts	27.00—
Mill Wrappers	18.00—
Box Board Chips	11.00—
No. 1 Mixed Paper	10.00—

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt	5.05—
Ground, cwt	4.30—
Powdered, cwt	5.10—
Blanc Fixe—	
Pulp, bulk, ton	100.00—
Dry, barrels	105.00—
Bleaching Powder—	
Drums, cwt	5.00 to 6.00
Casein (Domestic Standard) 20-30 mesh (bags), lb. 80-100 mesh (bags), lb.	27.00—
Argentine, lb.	23.00 to 24.00
China Clay—	
Domestic Filler Bulk (mine) ton	10.50 to 16.00
Domestic Coating Bulk (mine) ton	17.00 to 25.00
Imported (ship side) Bulk (lump) ton	30.00 to 30.00
Chlorine—	
Tank cars (wks) cwt	2.03—
Odatine (silicon), lb	1.25 to 1.35
Glyc. (C.P.) drums, lb	.29½ to .30
Litharge, powd. bbl. lb.	.16½ to .17

MARKET QUOTATIONS

Rosin (Gum)— New York, per 100 lbs.

E	9.10—
F	9.10—
G	9.10—
WW	9.35—

Rosin (Wood), carlots, F.O.B. South ..... 5.75—

Salt Cake—

Dom. bulk (wks) ton	26.00 to 28.00
Imp. bulks on dock—(Atl. ports) ton (Nom.)	22.00—

Soda Ash—

Bulk (works) cwt...	1.35—
Paper bags, cwt.....	1.70—

Soda (Caustic)—

Solid drums, cwt....	3.85 to 4.50
Ground and flake, drums, cwt.....	4.25 to 5.00

Sodium Silicate—

60 deg. 55 gal. drums, (works) cwt.....	1.60 to 1.70
40 deg. 35 gal. drums, (works), cwt..... ..	1.35 to 1.40

Starch—

Pearl, 140 lb. bags, cwt.	6.39—
Pearl, barrels, cwt...	6.39—
Paper (Sp.) bags, cwt.	6.39—
Powdered, barrels, cwt.	6.60—

Sulphur (Crude)

(Mine) bulk, long ton	26.50 to 28.00

Talc—

Dom. 100 lb. bags (mine) ton.....	25.00 to 28.00
Canadian	35.00 to 45.00

Titanium Dioxide—

Barium Pig. bbls., lb.	.22½ to .23
Calcium Pig. bbls., lb.	.22½ to .23

Zinc Oxide, bags ..... 13.50 to 15.50

WOOD PULP

Quotations on domestic and Canadian wood pulp, dollars per short air dry ton, delivered consuming mills including basic freight allowances, follow:

Bleached Sulphite	145.00—
Bleached Sulphite, Canadian	145.00—
Unbleached Sulphite	120.00—
Unbleached Sulphite, Canadian	125.00—
Bleached Soda	142.00 to 142.50
Bleached Soda, Canadian	142.00 to 142.50
Kraft Bleached	147.00 to 150.00
Kraft, Bleach., Hardwood	145.00—
Kraft, Bleach., Southern	150.00—
Kraft, Bleach., Canadian	150.00—
Kraft, Unbleached, Northern	132.50—
Kraft, Unbleached, Southern	115.00—
Kraft, Unbleached, Canadian	110.00 to 115.00
Kraft, Semi-Bleached, Southern	130.00 to 135.00
Sulphite Screenings	72.50—
Sulphate Screenings	67.50—
Groundwood	82.50 to 87.50

Quotations on imported wood pulp, dollars per short ton, on dock American Atlantic ports with varying freight allowances, follow:

Bleached Sulphite, Swedish	142.50—
Bleached Sulphite, Norwegian, freight allowed	142.50—
Bleached Sulphite, Finnish, freight allowed	145.00—
Unbleached Sulphite, Swedish	125.00—
Unbleached Sulphite, Finnish, freight allowed	125.00—
Kraft, Unbleached, Swedish, freight allowed	110.00 to 115.00
Kraft, Unbleached, Finnish, freight allowed	110.00 to 140.00
Kraft, Bleached, Swedish, on dock	147.50—
Kraft, Bleached, Norwegian	147.50—

PAPER

Quotations are mill quotations New York City

Boards—

Prices per ton, delivered in New York, 10 tons or more:

Plain chip	85.00—
News vat lined chip	90.00—
.009 chip, rolls	90.00—
Filled news	80.00—
Solid news	85.00—
White vat lined chip	125.00—
Chip tube and can stock	100.00—
Single manila lined chip	140.00—
Single jute lined chip	125.00—
Kraft liner	117.50 to 122.50

White patent coated:

.020	155.00—
.018	157.50—
.016	160.00—

Book Paper f.o.b. New York— per cwt.

Machine coated, two sides

70 lb. No. 2 enamel, 25x 38-500, trimmed 4 sides.	4 cases $17.25 Carloads $16.30
45 lb. enamel, 25x38-500, trimmed 4 sides	4 cases $13.05 Carloads $12.10

Uncoated

55 lb. No. 2 offset, 25x38 500, trimmed 4 sides	4 cases $14.80 Carloads $13.85
50 lb. A Grade English Finish, 25x38-500, untrimmed	4 cases $14.05 Carloads $13.10
20 lb. envelope, 17x22-500, untrimmed	Carloads $12.40
16 lb. tablet, 17x22-500	Carloads $11.35

Rag Content Bond—

(White, 5,000 to 10,000 lbs., basis 16 lb.)

100% rag	58.80—
75% rag	45.45—
50% rag	36.20—
25% rag	29.70—

Rag Content Ledger—

(White, 5,000 to 10,000 lbs.)

100% rag	58.80—
75% rag	45.45—
50% rag	36.20—
25% rag	29.70—

Sulphite Bond—

(White, 5,000 to 10,000 lbs., basis 16 lb.)

No. 1	19.85—
No. 2	19.15—
No. 4	17.45—

Sulphite Ledger—

(White, 5,000 to 10,000 lbs.)

No. 1	20.20—
No. 2	19.50—
No. 4	17.90—

News delivered in New York— per ton

Rolls, Standard (Contract)	125.00 to 126.00
Rolls (Spot)	(Nominal)
Sheets	138.00—

Tissues (Carlots) f.o.b. New York— per ream

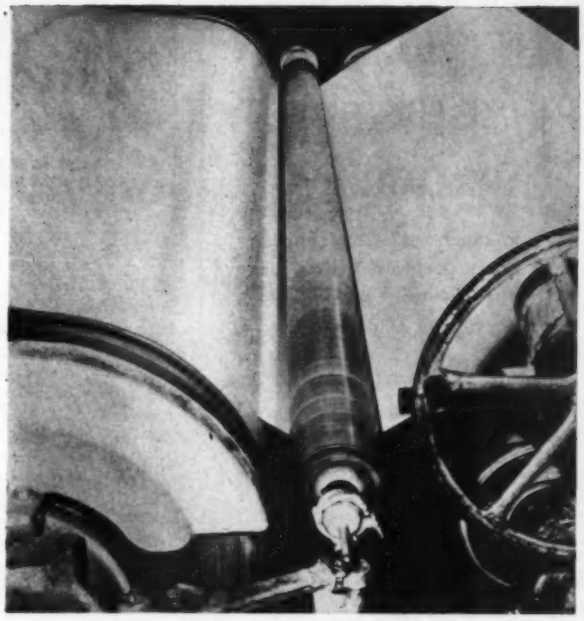
White No. 1	1.75—
White No. 2	1.35—
Bleached Anti-Tarnish	2.20—
Colored	2.00—
Anti-Tarnish Kraft	1.65—
Manila	2.00—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	1.00—
Napkins, full crepe and embossed (12½ lb. to Mshts.) per cs.	1.00—
Toilet, Bleached (M shts.) per cs.	9.35—
Toilet, Unbleached (M shts.) per cs.	7.90—

Towels f.o.b. New York— per case

Bleached	6.80—
Unbleached	5.90—

Wrappings (Kraft) f.o.b. New York— (Basis 50 lb. & heavier) per cwt.

Standard wrapping	8.25—
Butchers, counter rolls	8.50—
Standard bag, mill rolls	7.75—
Shipping sack, mill rolls	8.00—
Gumming, mill rolls	8.25—
Asphalting, mill rolls	8.00—
Envelope, mill rolls	9.50—



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It used to take 8 men 48 hours to drill through the clogged holes of a suction press roll in a Canadian mill. Not any more! Now the rolls are opened up, thoroughly and safely, in less than 6 hours—and without drilling.

It's all done by chemical circulation. Recommended Oakite solutions are passed through the holes, filtered, and returned to the tank for recirculation. That's all there is to it. You save time, money. Your equipment lasts longer.

Other mills using specialized Oakite materials and methods report as follows:

"Took 2 men 4 days to drill out suction press rolls. Now clean in 4 hours with Oakite solution."

"Well pleased with Oakite cleaning since we will get an added week or two of service from this felt."

"Felts returned to original color after being brown with pitch, and vacuum readings on the suction press rolls dropped as a result of felts being so clean."

FREE BOOKLET gives complete details, including schematic drawing of setup. Also tells how to restore felt absorbency; soak-clean Fourdrinier wires; remove slime and pitch; steam-clean save-alls, etc. Write for your copy—today. Oakite Products Inc., 74 Rector St., New York 6, New York.

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A set of ten 35mm sound slidefilms—all that is needed for a course in safety fundamentals. The films explain how to organize a safety program, what part the foreman plays in the program and how safety increases production. They also discuss specific safety activities, such as machine guarding, safety inspections, the first aid program, etc. Complete with leader's manual in an attractive leatherette case.

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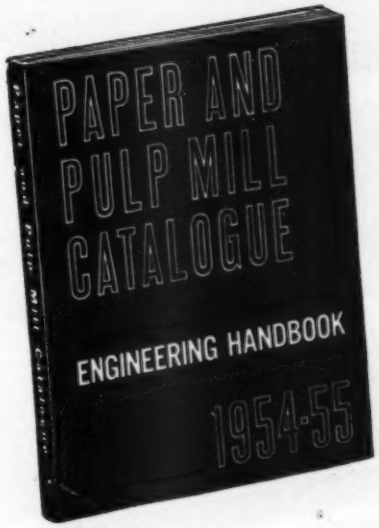

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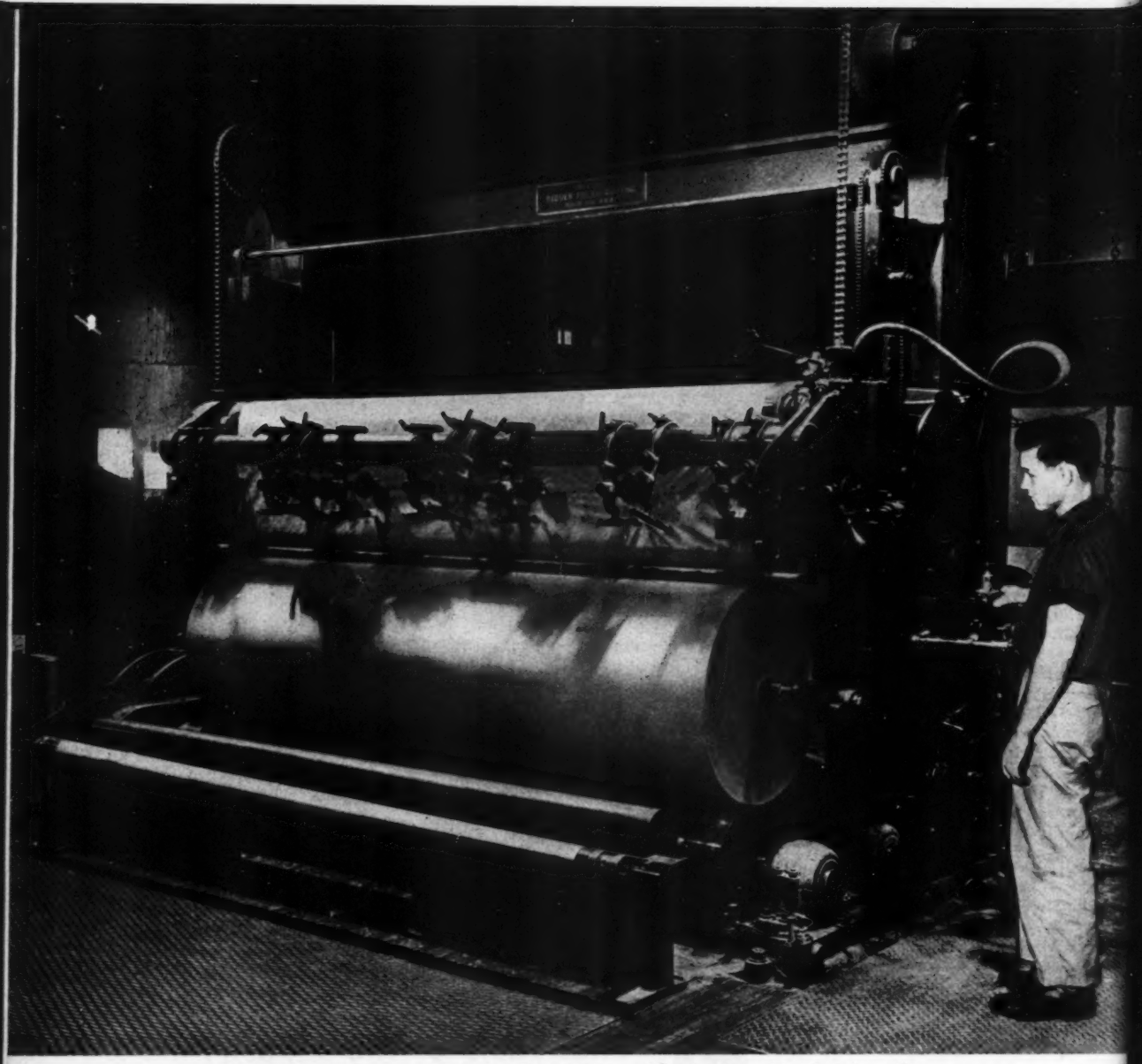

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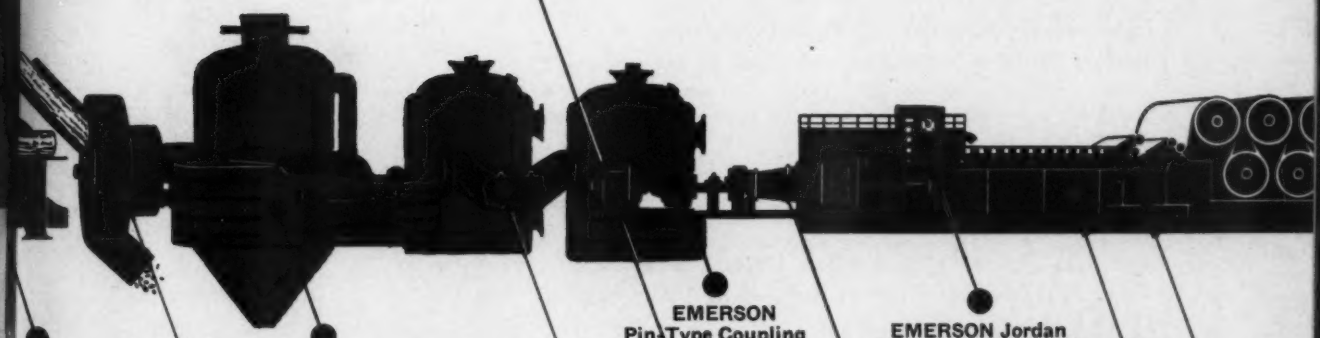
Easy Roll Separation

How BOLTON Quality serves the Paper Industry

Bolton quality is old, yet forever new — old because, since 1905, it has been synonymous with the best in materials, manufacturing processes and service — new because **Bolton quality** keeps always a step in advance of the industry's ever-changing requirements and methods. He who buys Bolton, buys best.

The Bolton representative in your area is prepared to tell you about Bolton's services. They include engineering advice based on years of experience in the paper industry, complete stocks on hand to supply needed items quickly. Our plant is prepared to design and produce products to fit your special requirements.

The key spots where **Bolton quality** serves the paper mill are shown below.



BOLTON
ker Knives

BOLTON
Chipper Knives

BOLTON Hog Knives

BOLTON Bedplates
BOLTON Beater Bars and Woods

EMERSON
Magnetic Separators

EMERSON
Pin-Type Coupling

EMERSON Jordans
BOLTON Wedgeless Plug
EMERSON Stainless Steel Jackets for All Types of Plugs
BOLTON Ring Type Plug Filling
BOLTON Hydro Truss Shell Filling

EMERSON Jordan
Plug Pressure Controls

EMERSON
Suction Box Covers

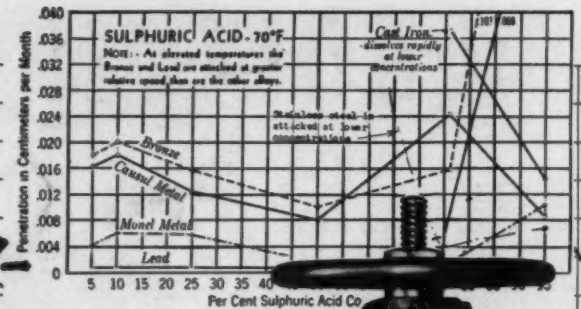
WALSH—WITHAM—EMERSON
Shower Pipes

● BOLTON Paper Knives ● BOLTON Rag Knives

John W. BOLTON & Sons, Inc.

Lawrence, Massachusetts, U.S.A.

GET BALANCED CORROSION-RESISTANCE



Corrosion rate of Causul Metal comp iron and other corrosion-resistin

with money-saving "CAUSUL" METAL VALVES

"Causul" Metal bodies and bonnets are far less expensive than the high alloys — but offer much better resistance to corrosion than cast iron or bronze. Trim is available in Type 316 Stainless Steel or Monel Metal, providing the best corrosion-resistance obtainable in the seats, discs, and stems. With this combination, you get excellent service at minimum cost . . . corrosion-resistant valve service that saves you money.

NOW WITH HEAVIER, STRONGER BODIES!

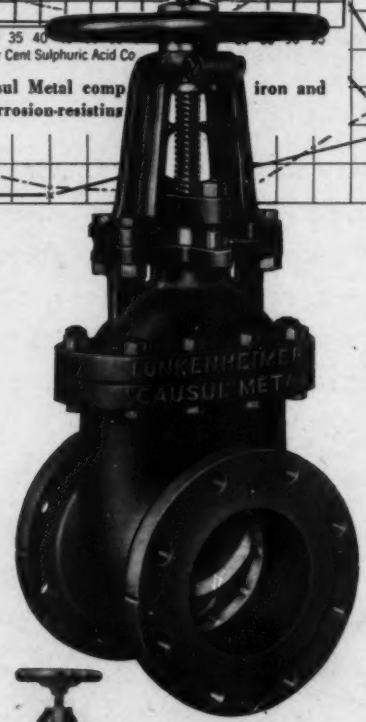
"Causul" Metal Valves are now made with heavier, thicker body walls for extra strength and durability. Castings are poured in a foundry specializing in handling this alloy.

NOW IN A GREATER RANGE OF SIZES!

"Causul" Metal Valves are now made in a complete size range — ½ to 2 inch, screwed ends . . . 1 to 8 inch, flanged ends — with both Monel and Stainless Steel trims.

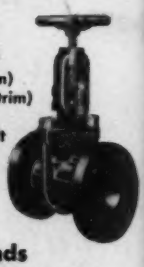
LUNKENHEIMER QUALITY

"CAUSUL" METAL is an exclusive Lunkenheimer development — containing iron, nickel, copper, chromium, and molybdenum. For detailed service recommendations, request a Confidential Service Information Form from your Lunkenheimer Distributor, or write to The Lunkenheimer Company, Box 360, Cincinnati 14, Ohio.



Screwed Ends
Fig. 2008-8 (Monel trim)
Fig. 2008-4 (Stainless trim)
½ to 2 inches

Flanged Ends
Fig. 2009-8 (Monel trim)
Fig. 2009-4 (Stainless trim)
1 to 1½ inches
2 to 3 inches—Two-Bolt Bonnet Design



Flanged Ends
Fig. 2009-8 (Monel trim)
Fig. 2009-4 (Stainless trim)
4 to 8 inches

BRONZE • IRON
STEEL • PVC VALVES

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

L-355-11